

STS-102

\*2868391

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FEB 22 '01

# PROCESSING OPERATIONS CONTROL OMI PLANNING SHEET

SPC  
197

Wad Number S6444-J01-R01 SITE LCC Elem CD V End Item 10X FLT: 029 DATE: 02/20/2001  
TIME: 07:57:54

Title: SSV ICE AND DEBRIS ASSESSMENT Sub Element/Zone 30

Project Work Order No. Hazard: ☒ Yes ☐ No SFOC Safety N/A TOTAL BOOK WC 120 USA ☐ Local Copy ☒ Firing Room Copy

Authorizing Document ORB329-281(ADD) Material & Equipment: ☒ Yes ☐ No MICR Req'd FEB 15 '01 ☐ Yes ☐ No OMRS: ☒ Yes ☐ No

## PERFORM THE FOLLOWING:

### Pre-Ops Setups

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps
9C0 VM 036	USA VM 046		N/A	936 VM 036	USA VM 044		
PL							

### OPS Support

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps

### Operating Instructions

Task	Seq	Steps	Task	Seq	Steps
	010			090	
	020			100	
	030			110	
	040			120	
	050			130	
	060			140	
	070			150	
	080				

### Post Ops

Task	Operation Number	Seq	Steps

### Appendices

Task	Seq
N/A	

### Subtask WAD's

N/A

Planner LISA RUTKOWSKI WC 120 USA FEB 15 '01 Ext 0746 QC Closure SPC 219 Date APR 3 '01 Page 1 OF 1

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Project Work Order No.	Hazard: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	SFOC Safety N/A TOTAL BOOK	WC 126 USA	<input type="checkbox"/> Local Copy <input checked="" type="checkbox"/> Firing Room Copy
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Authorizing Document ORB329-281(ADD)	Material & Equipment: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	MICR Req'd <input type="checkbox"/> Yes <input type="checkbox"/> No	FEB 15 '01	OMRS: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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## PERFORM THE FOLLOWING:

### Pre-Ops Setups

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps
			CVAS				TACCS
			USA VM 036				USA VM 044
			N/A				
			USA VM 046				
			USA VM 039				
			USA VM 031				

### OPS Support

Task	Operation Number	Seq	Steps	Task	Operation Number	Seq	Steps
------	------------------	-----	-------	------	------------------	-----	-------

### Operating Instructions

Task	Seq	Steps	Task	Seq	Steps
	010			090	
	020			100	
	030			110	
	040			120	
	050			130	
	060			140	
	070			150	
	080				

### Post Ops

Task	Operation Number	Seq	Steps
------	------------------	-----	-------

### Appendices

Task	Seq
N/A	







### Subtask WAD's

N/A

Planner LISA RUTKOWSKI	WC 126 USA FEB 15 '01	Ext 0746	QC Closure SPC 219	Date APR 3 '01	Page 1 OF 1
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# OMI TASK CLOSEOUT CHECKLIST

OMI No. <i>56444 J-1</i>	Run No. <i>1</i>	Task Control No. (TCN) <i>2868391-FIR</i>
Start Date <i>3/7/01</i>	Completion Date <i>3/29/01</i>	Closure Date <i>APR 3 '01</i>

	QC/Eng.	Date
1. Deviation Index: Verify total number of deviations agree with index. Verify entry is correct into OMI. <i>NO DEVS. R. Seale ETM 3/29/01</i>		<i>3/29/01</i>
2. Constraints List: Verify all constraints are accepted by QC or waived by Engineering. Verify that constraints list is complete and closed. <i>SUBMITTED TO S0007. R. Seale ETM 3/29/01</i>	<i>N/A</i>	
3. IPR's: Verify that all IPR's are closed or upgraded to problem reports or dispositioned as no constraint to OMI closure and incorporated in central IPR system and a copy of the central IPR sort attached.		<i>APR 3 '01</i>
4. Verify that material and equipment requirement list enclosed (if applicable).	<i>N/A</i>	
5. OMI: Verify that all pages or verification sheets are completed, stamped, and dated in the lower left/right hand corners.		<i>3/29/01</i>
6. OMI: Verify that all miscellaneous documents/procedures have sequence number referenced and stamped; e.g., photos, sample results, etc.		<i>3/29/01</i>
7. Planned task OMI satisfactorily completed. OPR: <i>R. Seale ETM 3/29/01</i>		<i>3/29/01</i>
8. LSS review prior to closure for CIL OMI's. MMC <i>NA</i> Thiokol <i>NA</i>		<i>APR 3 '01</i> 

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## **SSV ICE AND DEBRIS ASSESSMENT**

Element/End Item: **ALL**  
Flow/Usage: **ET-103 & SUBS**  
Facility: **LC 39**  
Design Center Concurrence: **MSFC/JSC**  
Category: **B**  
OPR: **ETM**  
TTL ORG: **SE**

**This document contains  
HAZARDOUS operations.**

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## 1.0 INFORMATION

### 1.1 Objective

Provide necessary tasks that document, monitor and evaluate ice and debris conditions to eliminate or minimize debris concerns of the integrated SSV during ET tanking, FRF, launch, and associated detanking.

#### Description

1. This OMI is performed as subtask to S0007/S0014/S0037.
2. This OMI provides documentation of ice/debris activities:
  - A. Pre-launch icing briefing
  - B. Pre-launch debris inspection
  - C. Countdown - Based timeline evaluation monitoring of ET TPS surfaces using OTV
  - D. OTV monitoring of seal/flange areas for cryogenic leakage
  - E. SSV OTV monitoring for debris conditions during countdown
  - F. Cryogenic replenish inspection for evaluation of SSV and facility debris concerns or anomalies
  - G. Evaluation of concerns/anomalies in the event of ET detanking
  - H. Review of engineering film data for SSME ignition, launch, ascent, ET separation, and orbiter landing.
3. Orbiter landing debris information is contained in the NASA publication for Ice and Debris Assessment. That report is referenced in this OMI for continuity of debris data.

## 1.2 Special Instructions All Operations

1. This OMI is run as a subtask to OMI's S0007, S0014, and S0037. All PAD clearing and controlled access operations will be performed per those OMI's.
2. Constraints will be statused by controlling OMI's S0007/S0014/S0037.
3. The OTV camera numbering scheme for PAD A/B is 0XX/1XX.
4. Task Team Leader assignment: NASA PH-H is TTL for L-20 Hour Walkdown, Final Inspection, and Post Launch/Drain Walkdown. ETM is TTL for all other operations.
5. From time stable replenish mode starts until start of final SCAN, scanning with individual cameras should be performed approximately once per hour.
6. Cameras 061/161, 063/163, and 070/170 may be released to NASA select with CICE concurrence.
7. All personnel participating in final inspection and post drain walkdown shall be current in following training:
  - A. Emergency PAD egress
  - B. Fire fighting
  - C. ELSA
8. Milestones:
  - A. MLP portion of post launch walkdown commences at approximately T + 1 hours.
  - B. PAD acreage portion of the post launch walkdown commences at approximately T + 2 hours. (may be deferred until preferred daylight hours.)
  - C. Post drain walkdown commences at approximately T + 4 hours after drain initiated (typically 1 1/2 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors dry).
9. Hands-on investigation required for all ET-TPS defects suspected of violating NSTS 08303 ice/debris inspection criteria.



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10. From time launch scrub is declared until 1.5 hours past time LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry, OTV camera scanning shall be performed approximately once per hour.
11. OTV cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171 shall be used to monitor LO<sub>2</sub>/LH<sub>2</sub> tank drain operations.
12. Excessive vapors are defined as being more severe than that described in NSTS 08303 - Ice/Debris Inspection Criteria or NSTS 16007 - Launch Commit Criteria - Hazardous Gas Subsystem.
13. Quality coverage is not required for performance of this OMI. Ref SFOC-GO0007, Ice and Debris Team Operations are exempt from quality coverage. The ROR (CTIF) performs the CMQC function for all non-hazardous operations.
14. Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in the bayonet fitting and the lithium button battery door is securely locked and taped in place.
15. Verify camera flash is deactivated.
16. Personnel using Kodak DC 50/120 camera shall verify alkaline batteries are properly installed.
17. Personnel using digital cameras shall not operate in H<sub>2</sub> leak or O<sub>2</sub> rich environment (23 percent or greater).
18. Personnel using the Sony MVC-FD91 camera shall verify the lithium ion battery is securely locked and the battery door is locked closed. Personnel shall verify that both battery doors (lithium ion and lithium button) are closed and taped shut.
19. Personnel shall verify that cameras and equipment are securely tethered when at the PAD while the SSV is present.

### 1.3 Operations List

Operation		Shop/ Cntl Rm Console	OPR	Haz (Y/N)	Duration (Hrs)
No.	Title				
10	Support Preparations	STM/ FR2	ETM	N	0.2
20	Ice Prediction Briefing	SE/ NA	ETM	N	0.5
30	Pre-launch Walkdown	SE/ NA	ETM	N	2.0
40	Ice Frost Debris Console Initial Configuration Setup	SE/ FR2	ETM	N	3.0
50	SSV Debris Assessment	SE/ FR2	ETM	N	18.0
60	Group 1 Monitoring LO2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
70	Group 2 Monitoring - LH2 Chill Down Thru T-0	SE/ FR2	ETM	N	15.0
80	Final Inspection	SE/ FR2	ETM	Y	3.0
90	LO2/LH2 Drain Monitoring	SE/ FR2	ETM	N	4.0
100	Console Securing	SE/ FR2	ETM	N	0.5
110	Summary Tape	SE/ FR2	ETM	N	18.0
120	Post Drain Walkdown	SE/ NA	ETM	Y	2.0
130	Post Launch Walkdown	SE/ NA	ETM	Y	3.0
140	Film Review	SE/ NA	ETM	N	15.0
150	Final Report	SE/ NA	ETM	N	0.5

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## 2.0 SAFETY INFORMATION

### 2.1 Hazards

#### Operation

1. Working at unprotected heights.
2. Walkdown at PAD while SSV is in stable replenish mode.

### 2.2 Safety Requirements

#### Operation

1. If lightning activity is forecast to be within 5 miles of launch PAD, CTC and SFOC safety shall implement provisions of adverse/severe weather and lightning policy contained in GSOP 5400 Ground Safety Operations Procedures.
2. There are no safing/shutdown or evacuation steps required in this OMI.
3. Hazardous operations within this subtask OMI will not be started until safety concurrence to proceed has been given per the integrated OMI controlling this subtask.

### 2.4 Reference Safety Documentation

Number	Rev	Title
KHB 1710.2	LI	KSC Safety Practices Handbook
GSOP 5400	LI	Ground Safety Operating Procedure

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### 3.0 STAGING REQUIREMENTS

#### 3.1 Referenced Engineering Documentation

##### 3.1.2 Documents

###### OPERATION 120

Document No.	Rev	Title
NSTS 08303	(LI)	NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA

#### 3.2 Parts, Materials, Equipment, and Special Tools

##### 3.2.8 Personal Protective Equipment

OPERATION 30	<b>Nomenclature</b> safety harness lanyard
OPERATION 80	<b>Nomenclature</b> safety harness lanyard Nomex coveralls with gloves and hoods ELSA
OPERATION 120	<b>Nomenclature</b> safety harness lanyard hardhats flame retardant coveralls
OPERATION 130	<b>Nomenclature</b> safety harness lanyard hardhats flame retardant coveralls

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## 4.0 PLANNING REQUIREMENTS

OIR Required Yes [ ], No [ X ]

### 4.3 LPS Requirements

#### 4.3.1 Computer Systems

PC GOAL  
CCMS Configuration  
CDS  
CMS

#### GSE Links/HIMs

Link	FEP	Location	HIM	Octal Addr	Function
------	-----	----------	-----	------------	----------

#### DPS Configuration

OPS Mode - \_\_\_\_  
Dedicated DEU/DDU - \_\_\_\_

#### Vehicle Links and Formats

Link	FEP	Freq	Downlink	Downlist
------	-----	------	----------	----------

#### Control Room Consoles Required

#### SDC/RTIF Configuration

#### RPS Configuration

Link	Freq	Element	Downlink Format
------	------	---------	-----------------

#### ESA monitors/hot spares

#### CCS Configuration

Link	FEP	Location	HIM	Octal Addr	Function
------	-----	----------	-----	------------	----------

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CCS Consoles Required

#### 4.4 Support Services, Commodities, and Equipment

##### 4.4.2 Communications

(Per controlling OMI S0007, S0014 or S0037)

Voice Recording:

Radio nets:

Paging:

Area warning:

Portable radios (loan pool):

<u>Type</u>	<u>Qty</u>	<u>Net/Freq</u>	<u>Record</u>	<u>Duration/Purpose</u>
-------------	------------	-----------------	---------------	-------------------------

Portable OIS units:

Special communications:

##### 4.4.3 OTV

(Per controlling OMI S0007, S0014 or S0037)

**OTV Cameras required:** 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

**OTV Cameras to be recorded:** 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171

OTV Monitor:

Special OTV requirements:

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#### 4.4.4 Countdown Display/Status

<u>Display Required</u>	<u>Bldg</u>	<u>Room</u>	<u>Operation Time</u>
Timing	LCC	FR2	Duration of Test
Countdown and GMT	LCC	FR2	Duration of Test

#### 4.4.8 Services

<u>Service/Special Requirements</u>	<u>Location</u>	<u>Purpose</u>
SFOC Safety	LC-39 A&B	Safety Support
ELSA'S (8)	LC-39 A&B	Inspection Team Use
Radio Net 105	LC-39 A&B	Inspection Team Use

#### 4.4.12 Propellants, Gases and Chemicals

<u>Commodity</u>	<u>Spec No.</u>	<u>Quantity</u>	<u>Rcvr</u>	<u>Location</u>	<u>Minimum Press</u>	<u>Delivery Time</u>
GN <sub>2</sub>	SES-0073 -6.3-5	Min 750 Cu ft	PH-H 861-3645	Pad 39B Camera Site 2	3000 PSI	1 week prior to T-0

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## 5.0 CONFIGURATION ACCOUNTING AND VERIFICATION

### 5.1 Specific OMRS Requirements Satisfied by this TOP

OMRS NO.	NOMENCLATURE/ EFFECTIVITY	SEQ-STEP (CAP)
S00E00.021	ET TPS MON DURING DETANK TAF;C	90-005
S00E00.031	POST DETANK ET TPS INSPECT TAF;C	120-002
S00FA0.900	PRELAUNCH WEATHER BRIEFING (L-1 DAY) VAF1-90	20-001
S00FB0.005 (1 )	ET TPS SURFACE MONITORING T23,27-29,31-999	60-012 70-012
S00FB0.350 (1 )	MONITOR GO2 VENT HOOD VAF1-90	50-021
S00FB0.360 (1 )	MONITOR ET/ORB MPS FOR LEAKAGE VAF1-90	70-012
S00L00.150	HIGH WIND ET NOSE INSPECTION SAF;C	50-018 60-012
S00U00.010 (1 )	POST LAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	130-002
S00U00.011 (1 )	ENGR REVIEW & ANALYSIS OF LAUNCH FILM SAF1-999	150-002
S00U00.020-A (1 )	AN ENGINEERING PAD INSPECTION TEAM SAF1-999	80-002
S00U00.020-C (1 )	INSPECT ORBITER AFT ENGINE SAF1-999	80-002
S00U00.020-D (1 )	INFRARED SURVEILLANCE SAF1-999	80-002
S00U00.030 (1 )	PRELAUNCH SHUTTLE/PAD AREA INSPECTION SAF1-999	30-001



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## 5.5 List of References

### OPERATION 20

Reference No.	Rev	Title
NSTS 16007	(LI)	NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F

### OPERATION 30

Reference No.	Rev	Title
80901019010	(LI)	ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

### OPERATION 40

Reference No.	Rev	Title
79K24576	(LI)	OTV System Installation, LC 39, Pad A
79K24522	(LI)	OTV System Installation, LC 39, Pad B

### OPERATION 50

Reference No.	Rev	Title
SPI SP-519	(LI)	OMI and OM Implementation
SFOC GO0007	(LI)	Quality Planning Requirements Document (QPRD)

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### OPERATION 10 Support Preparations

Shop: STM  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.2

10-1 STM JYVO 138

Verify PAD OTV system is configured to support S6444 as scheduled.

Support: COMM

10-2 STM JSTC 111  
JSTC \*SCB 114

Verify eight 10-minute ELSA's available at complex J for use by Final Inspection Team (ref S0007/S0014/S0037).

Support: LS

10-3 STM TBC 136

Operation - Support Preparations complete.

\*\*\* End of Operation 10 \*\*\*

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## OPERATION 20 Ice Prediction Briefing

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

### NOTE

Ref: NSTS 16007 (LI) NSTS Program Launch Commit Criteria - Hazardous Gas Subsystem and Appendix F defines the ET No-Ice Zone.

#### 20-1 CICE

Conduct L-1 day ice prediction briefing with launch director.

PH-H Signature

*Jay E. Quinn* 3/8/01

OMRSD S00FA0.900

USA  
VM  
070

#### 20-2 Operation - Ice Prediction Briefing complete.

\*\*\* End of Operation 20 \*\*\*

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### OPERATION 30 Pre-launch Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD  
Hazard (Y/N): N  
Duration (Hrs): 2.0

#### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

#### NOTE

This operation is performed at approximately L-20 hours. When this operation is performed in support of a 24 hour scrub turnaround, the preceding launch scrub post drain walkdown and this pre-launch walkdown may be performed concurrently.

Inspections may also be performed from the RSS, GO<sub>2</sub> Vent Arm (GVA), -Y OWP, or +Y OWP if still extended and accessible.

Ref: 80901019010 (LI) ET Post Build Acceptance and In-Process Rework Requirements Manual - Offsite

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are optional walkdown participants.

NASA Engr	(4)
SFOC Engr	(2)
LMSSC - LSS	(1)
Boeing - LSS	(1)
SRB ELE	(1)
Thiokol - LSS	(1)

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30-1 Debris inspection team **perform** walkdown of SSV and MLP per following:

1. Team leader **verify** S6444 pre-test briefing complete.
2. **Assemble** following essential personnel  
  
NASA PH-H Engineering - 1  
SFOC ETM Engineering - 1
3. **Inspect** following areas (as a minimum) from the MLP, RSS and FSS to identify/ resolve potential debris sources.

Areas to be inspected

- A. Launch vehicle external surfaces
  - Orbiter
  - SRB's
  - External Tank
- B. MLP surfaces
  - LH and RH SRB holddown posts
  - Deck including deck bolts, fixtures, and edge gutters
  - SSME LH and RH SRB exhaust openings, and sound suppression (SS) troughs
  - TSM's and camera housings
4. Ref Table 30-1, **document** and SIM Photograph SSV and Launch PAD Configuration.

Description: Pre launch walkdown.

OMRSD S00U00.030-1

USA  
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- 30-2 Record all facility discrepancies in S0007. Submit copy to PAD leader and notify TBC/CTC. Verify no constraints to continue.

PH-H *[Signature]* <sup>PH-H2</sup> Date 3-7-01

ETM Tom Ford Date 3-7-01

- 30-3 Operation - Pre-launch Walkdown complete.

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Table 30-1 Photo Requirements for SSV and Launch Pad Configuration			
Photos from MLP			
<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET -Z	Vertical	28 mm	
Aft Dome	Horizontal	28 mm	
Aft Dome	Horizontal	35-70 mm	
LH SRB from North	Horizontal	35-70 mm	All water troughs in view
LH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
LH SRB from East	Vertical	35-70 mm	
RH SRB from North	Horizontal	35-70 mm	All water troughs in view
RH SRB from North	Vertical	35-70 mm	3-4 water troughs in view
RH SRB from West	Vertical	35-70 mm	
SRB Heater Elec T-0	Horizontal	35-70 mm	Foam intrusion; May need flash
North HDP	Vertical	35-70 mm	Representative view
South HDP	Vertical	35-70 mm	Representative view
TSM T-0 LH <sub>2</sub>	Vertical	35-70 mm	Flash needed
TSM T-0 LO <sub>2</sub>	Vertical	35-70 mm	Flash needed
Orbiter Left & Right Wing	Vertical	35-70 mm	From below ET (1 Photo each wing)

ET  
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### 135 Ft Level Photos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LO <sub>2</sub> UMB	Vertical	35-70 mm	From OWP usually during T5401
LH <sub>2</sub> UMB	Vertical	35-70 mm	From OWP usually during T5401

### 215 Ft Level Photos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET surfaces from FSS	Vertical	35-70 mm	
LH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
RH SRB Frustrum and FWD skirt	Vertical	35-70 mm	
Jack Pad C/O's	Horizontal	35-70 mm	Flash needed (1 each C/O)
LO <sub>2</sub> Ogive Cable Tray	Vertical	35-70 mm	From RSS roof

### 255 Ft Level Photos

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
ET surfaces with GO <sub>2</sub> vent ducts in view	Vertical	35-70 mm	
GO <sub>2</sub> vent ducts	Horizontal	250 mm	

\*\*\* End of Table 30-2 Photo Requirements for SSV and Launch Pad Configuration

\*\*\* End of Operation 30 \*\*\*



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

## OPERATION 40 Ice Frost Debris Console Initial Configuration Setup

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 3.0

### NOTE

The next step sets up the photo processing laptop for use in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Network or equipment failures on the photo processing machine shall be annotated below.

- 40-1 Connect to KSC ground ops network and **configure** laptop computer to perform photo processing/ analysis.

Notes Complete 1300 3/7/01

ME
10

### NOTE

The next step verifies the setup of the infrared scanners. This is not a constraint to set up of the ice console. IR scanner condition shall be annotated below.

- 40-2 Verify IR scanner operation condition, annotate below.

RSS: Working OK

CS 2: Working OK  
per B. Speece

ME
10

 3/7/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

The next step verifies the operation of console monitors in the Firing Room. This is not a constraint to set up of the console or to final inspection team operations. Equipment condition shall be annotated below.

40-3      Verify console condition by powering on monitors and tape recorders.

Monitors: OK

ME  
10 3/7/01

Tape recorders: OK (only 1)

**NOTE**

ET OTV pre-mapping/initial position of cameras may be performed in random order.

Ref: 79K24576 (LI) OTV System Installation, LC 39, Pad A and

Ref: 79K24522 (LI) OTV System Installation, LC 39, Pad B define OTV camera locations.

FOV designates field-of view. RSS and -Y OWP must be retracted for completion of pre-mapping.

Pre-mapping steps/substeps in the remainder of this operation need not be performed if supporting a scrub turnaround and if performed during a previous run.

It is preferred to record all pre-mapping scanning on a single tape. However, multiple tapes may be used when lighting/ launch countdown constraints necessitate such.

ME  
10 3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

40-4 CVM1 JTV1 223

Perform OTV pre-mapping of External Tank exterior surfaces using OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, and 067/167 as follows:

- **Insert** designated pre-map tape into trouble console VCR.
- **Punch-up** camera number on trouble monitor.
- **Start** recording on pre-map tape. **Record** start time (GMT).
- **Scan** from top-to-bottom, left-to-right and right-to-left at approximately full zoom-in.
- **Stop** recording on pre-map tape. **Record** stop time (GMT).
- **Record** data in Table 40-1.
- **Repeat** with each OTV camera listed until each has been used to scan the External Tank.
- **Remove** pre-map tape from trouble console VCR.

ETM \_\_\_\_\_

ME  
10

Date

3/7/1

Not Performed: NA

40-5 CVM1 JTV1 223

Position OTV Cameras 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 070/170, and 071/171 to initial positions as defined in Table 40-2.

ETM \_\_\_\_\_

ME  
10

Date

3/7/1

Not Performed: NA

ME  
10

3/8/1

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 40-1 ET Pre-Mapping Data		Tape # 495
OTV Camera	Start Time (GMT)	Stop Time (GMT)
004 / 104	<u>18:20</u>	<u>18:35</u>
009 / 109	<u>18:36</u>	<u>18:49</u>
013 / 113	<u>18:50</u>	<u>18:54</u>
033 / 133	<u>18:55</u>	<u>18:58</u>
042 / 142	<u>18:59</u>	<u>19:09</u>
054 / 154	<u>19:10</u>	<u>19:18</u>
055 / 155	<u>19:19</u>	<u>19:29</u>
056 / 156	<u>19:30</u>	<u>19:34</u>
060 / 160	<u>19:35</u>	<u>19:37</u>
061 / 161	<u>19:38</u>	<u>19:43</u>
062 / 162	<u>19:44</u>	<u>19:51</u>
063 / 163	<u>19:52</u>	<u>19:59</u>
064 / 164	<u>20:00</u>	<u>20:06</u>
065 / 165	<u>20:07</u>	<u>20:11</u>
066 / 166	<u>20:12</u>	<u>20:14</u>
067 / 167	<u>20:15</u>	<u>20:18</u>

Notes: Cam 155 has dirty lense. OTV notified. - Spots are inside and cannot be removed.

3/7/01

ME  
TO

ME  
TO 3/8/1

**Table 40-2 OTV Camera Initial Positions**

OTV Camera	Initial Position
004 / 104	FOV centered on GUCP
009 / 109	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 063/163 and 064/164.
013 / 113	Full zoom in. View SW GO <sub>2</sub> Vent Louver area.
033 / 133	FOV perpendicular to ET and with LO <sub>2</sub> -to-Intertank splice at frame top and LH <sub>2</sub> -to-Intertank splice at frame bottom. Then tilt down until XT2058 is in frame center.
042 / 142	FOV centered on Orbiter Access Arm-to-Orbiter interface.
054 / 154	FOV to encompass approximately 3 feet forward of XT2058 to 2 feet aft of XT2058. Orbiter wing and SRB should be in view at frame left.
055 / 155	Set FOV on north bridge LH <sub>2</sub> pipeline flange.
056 / 156	FOV with LH <sub>2</sub> Aft Dome in frame bottom and XT2058 in view at frame top.
060 / 160	Full zoom in. View SW GO <sub>2</sub> Vent Louver area.
061 / 161	Full zoom-in. Adjust FOV until ET LO <sub>2</sub> -to-Intertank splice is centered vertically and view is perpendicular to ET. Pan right until edge of the ET comes into view. Note: LO <sub>2</sub> Tank may pass out-of-view.
062 / 162	Full zoom in. View NW GO <sub>2</sub> Vent Louver area.
063 / 163	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 064/164.
064 / 164	FOV on LH <sub>2</sub> Umbilical including ET/Orbiter interface. Vary close-up and wide angle views with 009/109 and 063/163.
065 / 165	Full zoom out. Set FOV on aft part of ET with frame bottom approximately 2 feet below LH <sub>2</sub> Aft Dome.
066 / 166	FOV perpendicular to ET with LO <sub>2</sub> -to-Intertank splice at frame top. Then tilt down until Orbiter RH Wing/SRB intersection is in frame lower right.
067 / 167	Set FOV with LH <sub>2</sub> Aft Dome toward frame bottom and 2 <sup>nd</sup> black ring of SRB in view.
070 / 170	Select down wind camera of these two as wide angle view of the SSV.
071 / 171	Set up wind camera for close-up view of SSME's.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

40-6 Operation - Ice Frost Debris Console Initial Configuration Setup complete.

ETM 

ME
10

 Date 3/7/01

\*\*\* End of Operation 40 \*\*\*

ME
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3/8/1

40-6

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

## OPERATION 50 SSV Debris Assessment

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 18.0

### NOTE

Steps in this operation are contingent upon progression of launch countdown operations and may not be performed if countdown is terminated.

Entire Operation Not Performed: N/A

### NOTE

Until otherwise indicated, all times are referenced to S0007, S0014 or S0037 timelines.

No operations/steps within this subtask OMI may be performed as a stand-alone procedure. This OMI may only be performed as a subtask to S0007/S0014/S0037.

### NOTE

Ref: SPI SP-519 (LI) OMI and OM Implementation and Ref: SFOC GO0007 (LI) Quality Planning Requirements Document (QPRD), following step complies with requirements for ROR-as-CMQC function.

50-1

CTIF	TBC
TBC	CMQC 136

Notify TBC that CTIF will perform the CMQC function for STS 102, S6444 run 1. Request TBC notify CMQC that the ROR-as-CMQC option will be exercised for STS 102, S6444 run 1.

3/8/11  
ME  
10


01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-2

CTC	TBC	232
TBC	CTIF	136


Perform OTV and ice/frost monitoring area setups.

ETM  Date 3-7-01

50-3

CTIF	TBC	136
TBC	CTC	
CTC	STM	232


Verify Operation 10- Support Preparations complete.

ETM  Date 3-7-01

50-4

CTIF

Verify Operation 20 - Ice Prediction Briefing and Operation 30- Pre-launch Walkdown complete.

ETM  Date 3-7-01



3/8/11



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-5

CTIF CVM1 222  
CVM1 222

Verify:

- All OTV cameras are on, tapes in recorder, and ready to commence OTV scanning, monitoring, and recording.
- Trouble tape recorder is ready.
- Ice Frost Debris Console Initial Configuration Setup complete.

ETM

ME  
08

Date 3-7-01

50-6

CTIF CICE 222  
CVM1  
CVM2  
CIPC  
CTIF JYVR 138  
CVM1 JTV1 223  
CVM2 JTV2 225

All personnel participating in OTV operations **report** test ready status.

ETM

ME  
08

Date 3-7-01

Support: COMM

50-3

ME  
10

78/1

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-7

CTIF	TBC	136
TBC	CTC	232

Ice Frost Console Area Setups for OTV scanning complete.  
**Report** readiness.


ETM  Date 37-01

Not Performed: N/A

50-8

CTIF CVM1 222

From start of LO<sub>2</sub> chilldown until seal deflation/GO<sub>2</sub> vent hood retraction, **monitor** the +Y/-Y GO<sub>2</sub> vent seal-to-ET interface for seal fretting and continuous GO<sub>2</sub> escape.

ETM  Date 3/8/11

Not Performed: N/A

  
3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

GO<sub>2</sub> vent seal fretting could induce damage to ET SOFI. Continuous GO<sub>2</sub> venting could result in formation of ice in the no ice zone (ref NSTS 16007). Ultimate decision to lift the vent hood rests with CMEC.

50-9

CTIF TBC 136  
CMEC

If +Y/-Y GO<sub>2</sub> vent seal fretting or continuous GO<sub>2</sub> escape detected from start of LO<sub>2</sub> chilldown until seal deflation, **notify** CMEC for GO<sub>2</sub> vent hood removal.

ETM NA Date 3/8/1

Not Performed: ME 10

50-10

CTIF CIPC 222

**Monitor** wind speed and direction from start of LO<sub>2</sub>/LH<sub>2</sub> chill down through launch/scrub. CIPC **notify** CTIF if winds measured at 38 knots or greater from North +/-30 degrees as measured at 60 feet.

ETM ME 10 Date 3/8/1

Not Performed: N/A

50-5

ME 10  
3/8/1

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-11

CTIF CVM1 222

Perform Operation 60 - Group 1 Monitoring.

ETM 

ME
10

 Date 3/8/11

Not Performed: N/A

50-12

CTIF CVM2 222

Perform Operation 70- Group 2 Monitoring.

ETM 

ME
10

 Date 3/8/11

Not Performed: N/A

50-13

CTIF CVM2 222

Once per hour minimum, after start of LO<sub>2</sub>/LH<sub>2</sub> (until LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry), scan LO<sub>2</sub> feed line brackets and flange closeouts per Table 50-1.

ETM 

ME
10

 Date 3/8/11

Not Performed: N/A

ME
10

3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-14

CTIF CICE 222

As count proceeds, for concerns/ observations identified:

1. **Record** observation/concern on trouble tape per Table 50-1.
2. **Document** observed condition on Table 50-2, Observation Worksheet.

ETM \_\_\_\_\_  Date 3/8/11

Not Performed: NA

50-15

TBC CTIF 136  
CTIF CICE 222

**Perform** Operation 80 - Final Inspection when called by  
S0007/S0014/S0037.

ETM \_\_\_\_\_  Date 3/8/11

Not Performed: NA

50-7

  
3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

Final SSV scan typically commences at L-2 hours.

50-16

CTIF CVM1 222  
CVM2

Perform final SSV scan.

ETM

ME  
10

Date

3/8/11

Not Performed: NA

50-17

CTIF CVM1 222  
CVM2

At start of T-9 minute hold, configure OTV cameras for terminal count.

ETM

ME  
10

Date

3/8/11

Not Performed: NA

ME  
10

3/8/11

50-8

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-18

If winds are from the north (+/-30 degrees) and are 38 knots or greater:

1. **Monitor/videotape** nose cone area during high winds.
2. **Verify:**
  - A. No ice formation on the +Y and -Y GO<sub>2</sub> vent seal footprint areas.
  - B. No damage to the ET TPS at the +Y and -Y GO<sub>2</sub> vent seal footprint areas.
  - C. No damage to the +Y and -Y GO<sub>2</sub> vent seals themselves.
  - D. No evidence of GO<sub>2</sub> leakage from +Y/-Y GO<sub>2</sub> vent seals to ET interface.

OMRSD S00L00.150

USA  
VMA  
010

ETM NA Date 3/8/11

Not Performed: 

ME
10

50-19

CTIF

**Verify** launch or launch scrub (drain back). **Record** data.

Launch ✓ Scrub NA

Date 3/8/11 GMT Time 11:42 GMT

Scrub at T- NA

ETM 

ME
10

 Date 3/8/11

50-9

ME
10

 3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

When completely filled and drain is initiated, it takes approximately 1 hour until the LH<sub>2</sub> tank low level sensors read dry, and approximately 1.5 hours until the LO<sub>2</sub> tank low level sensors read dry.

50-20

CTIF CVM1 222  
CVM2

If launch scrubbed (or drain back declared) after start of LO<sub>2</sub>/LH<sub>2</sub> slow fill mode:

- **Perform** Operation 90 - LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring.
- **Record** observations/concerns on trouble tape per Table 50-1.
- **Document** all observations/concerns on Table 50-2 Observation Worksheet.

ETM NA Date 3/8/11  
Not Performed: ME 10

50-21 CTIF

GO<sub>2</sub> Vent seal to ET interface monitoring for seal fretting and continuous GO<sub>2</sub> escape complete.

OMRSD S00FB0.350-1 USA  
ETM ME 10 Date 3/8/11  
Not Performed: NA

ME 10  
3/8/11



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-22

CTIF CVM1 222  
CVM2

Terminate scanning operations.

ETM \_\_\_\_\_  Date 3/8/11

50-23

CTIF CVM1 222  
CVM2


Perform Operation 100 - Console Securing.

ETM \_\_\_\_\_  Date 3/8/11

50-24

CTIF

If LO<sub>2</sub>/LH<sub>2</sub> tanking started, **perform** Operation 110 - Summary  
Tape.

ETM \_\_\_\_\_  Date 3/8/11

Not Performed: NA

50-11



3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

Following step may be not performed at CTIF discretion.

50-25      CTIF      TBC      136  
             TBC      STM

If Post Drain Walkdown to occur at night, **request** PAD xenon lighting be maintained/activated for duration of walkdown.

Not Performed:                     

ME  
10

**NOTE**

Post drain walkdown typically commences approximately 1.5 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry.

50-26

**CTIF**

If launch scrubbed after start of LO<sub>2</sub>/LH<sub>2</sub> tanking, **perform** Operation 120 - Post-Drain Walkdown.

ETM NA      Date 3/8/11

Not Performed:                     

ME  
10

50-27

**CTIF**

If launch occurred, **perform** Operation 130 - Post launch Walkdown.

ETM                           Date 3/8/11

Not Performed: NA

ME  
10

ME  
10

3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

50-28

CTIF

If launch occurred, **perform** Operation 140 - Film Review.

ETM 

ME
10

 Date 3/8/11

Not Performed: NA

50-29

SSV Debris Assessment complete.

50-13

ET  
01

3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-1 Observation Documentation Procedure

1. CTIF CVM1 222 Locate anomaly/concern on pertinent OTV(s)  
CVM2
2. CTIF Punch-up pertinent OTV on trouble monitor.  
Update trouble tape log in table below.
3. CTIF Start the trouble tape.

**NOTE**

Trouble tape shall be allowed to run until sufficient OTV documentation of observation/concern has been made. OK to change OTV's while trouble tape is running.

4. CTIF After observation/concern has been documented on the trouble tape, stop the trouble tape. Update trouble tape log below.

**TROUBLE TAPE LOG**

Trouble Tape No.	Start Time (GMT)	Stop Time (GMT)	OTV	Description
1	03:42	03:43	156	FIRST SHOTS ON AFT m/L CYL
1	03:44	03:47	154	LOZ FIL SCAN
1	04:20	04:21	156	AFT m/L LHZ FIRST SHOTS
1	04:41	04:44	154	LOZ F/L SCAN
1	04:51	04:52	163	-1 VERT STRUT "CRACK"
1	05:44	05:46	154	LOZ F/L SCAN
1	06:47	06:49	133	" " "
1	07:43	07:47	154	" " "
1	08:33	08:34	170	LOZ Barrel/Ogive (17/12)
1	08:34	08:35	154	LHZ Barrel (17/12)

ET  
01

3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-1 Observation Documentation Procedure

TROUBLE TAPE LOG

Trouble Tape No.	Start Time (GMT)	Stop Time (GMT)	OTV	Description
1	08:38	08:39	154	LO2 F/L Scan
1	09:39	09:40	154	LO2 F/L Scan
1	09:40	09:48	170	LH2 LO2 Barrel
1	10:23	10:27	154	LH2 Barrel Frost
1	10:29	10:31	170	LO2 Barrel Frost
1	11:02	11:03	170	LO2 Barrel Frost
1	11:03	11:05	154	LH2 Barrel Frost
1	11:33	CONTINUOUS	179	NASA Select
1	11:34		142	OAA Retract
1	11:37		164	Body Flag Mal - Dse 8 Mar 01
1	11:39		162	Body Flag
1	↓			"
1	11:39		160	GOX Vent Hood Retract
1	11:40		162	" " " "
1	11:40		113	" " " "
1	11:41		171	Main Engine
1	11:42		179	Launch

\*\*\* End of Table 50-1 Observation Documentation Procedure \*\*\*

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
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3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. 001

Observed By: WOLLAM

Date 3/8/1 Time 06:30 GMT 11:28

Camera No. (or Walkdown) 170 and 154

Description:

Large areas of frost on LH2 and  
L02 tank barrels in +Y/+Z quadrant.  
Frost also seen at PAL ramp edges and at  
+Y Thrust strut knuckle.

Acceptance Rationale (or IPR/PR No.):

All areas are acceptable per NSTS  
08303.

CICE [Signature] Date 3/8/1

CTIF [Signature] [Signature] [Signature] Date 3/8/1  
ME  
10

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
01

3/8/01



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

**OBSERVATION DOCUMENTATION**

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
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01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

**OBSERVATION DOCUMENTATION**

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

ET  
01

3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 50-2 Observation Worksheet

OBSERVATION DOCUMENTATION

Record following information for condition observed:

Observation No. \_\_\_\_\_

Observed By: \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ GMT \_\_\_\_\_

Camera No. (or Walkdown) \_\_\_\_\_

Description:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Acceptance Rationale (or IPR/PR No.):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CICE \_\_\_\_\_ Date \_\_\_\_\_

CTIF \_\_\_\_\_ Date \_\_\_\_\_

\*\*\* End of Table 50-2 Observation Worksheet \*\*\*

\*\*\* End of Operation 50 \*\*\*

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

## OPERATION 60 Group 1 Monitoring LO<sub>2</sub> Chill Down Thru T-0

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

### NOTE

Do not perform this operation if launch scrub declared before LO<sub>2</sub> Chill Down commences.

Operation Not Performed: N/A

### NOTE

This operation monitors LO<sub>2</sub> Ogive and Barrel and associated components/ areas from start of Chill Down through T-0 via OTV cameras 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164.

OTV cameras 013/113 and/or 062/162 will view -Y GO<sub>2</sub> Vent Hood Seal at all times. At no time will both cameras be positioned away from the -Y GO<sub>2</sub> Vent Hood Seal.

OTV cameras 068/168 and 069/169 view SW and NE GO<sub>2</sub> Vent Areas respectively. These are fixed FOV cameras and do not have pan, tilt, etc. capability.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

Noted requirements satisfied by completion of this operation.

OMRS S00FB0.005-1

OMRS S00L00.150-1

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### LO<sub>2</sub> Chill Down To L-2 Hour Mark

60-1 CVM1 JYVR 138

At start of vehicle LO<sub>2</sub> Chill Down, **start** recorders for cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169.

ETM R. Brewer Date 03-08-01

Support: COMM

60-2 Record LO<sub>2</sub> MPS Chill Down start date and time (GMT).

LO<sub>2</sub> MPS Chill Down Date 03-08-01 GMT Time <sup>02:29</sup> 02:29 GMT

ETM R. Brewer Date 03-07-01

60-3 CVM1 JTV1 223

From start of LO<sub>2</sub> Chill Down until start of LO<sub>2</sub> Fast Fill on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169 **monitor/videotape** ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ETM R. Brewer Date 03-07-01

Support: COMM

Not Performed: N/A

ET  
01

3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

60-4 Record LO<sub>2</sub> Slow Fill start date and time (GMT).

LO<sub>2</sub> Slow Fill Date 03-08-01 GMT Time 02:56 GMT

ETM R Brewer Date 03-07-01

Not Performed: N/A

60-5 Record LO<sub>2</sub> Fast Fill start date and time (GMT).

LO<sub>2</sub> Fast Fill Date 03-08-01 GMT Time 03:08 GMT

ETM R Brewer Date 03-07-01

Not Performed: N/A

60-6 CVM1 JTV1 223

From start of LO<sub>2</sub> Fast Fill until LO<sub>2</sub> stable replenish mode is established, **monitor/videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. **Scan** LO<sub>2</sub> Tank. **Alternate** cameras and **scan** from Intertank to LO<sub>2</sub> Barrel Splice to GO<sub>2</sub> Vent Hood. No cryogenic liquid or excessive vapors allowed.

ETM Tom Ford Date 3.8.01

Support: COMM

Not Performed: NA



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

60-7 Record LO<sub>2</sub> Topping date and time (GMT).

LO<sub>2</sub> Topping Date 3-8-01 GMT Time 09:10 GMT

ETM Tom Ford Date 3-8-01

Not Performed: NA

60-8 Record LO<sub>2</sub> Stable Replenish mode start date and time (GMT).

LO<sub>2</sub> Stable Replenish Date 3-8-01 GMT Time 09:17 GMT

ETM Tom Ford Date 3-8-01

Not Performed: NA

60-9 CVM1 JTV1 223

From time LO<sub>2</sub> Stable Replenish mode is established until time for final SSV scan (approximately L-2 hours), **monitor, scan and videotape** ET-TPS surfaces on OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163, 064/164, 068/168, and 069/169. No cryogenic liquid or excessive vapors allowed.

ETM Tom Ford Date 3-8-01

Support: COMM

Not Performed: NA

ME  
10

3/8/1

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### Final SSV Inspection Scan

#### NOTE

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

During Final SSV Inspection Scan the camera lights on OTV cameras 061/161 and 062/162 shall be turned "Off" when view passes over the Orbiter cockpit to preclude "distracting" the Flight Crew.

60-10 CVM1 JTV1 223

**Perform** Final SSV Inspection Scan with OTV cameras 004/104, 013/113, 060/160, 061/161, 062/162, 063/163 and 064/164. Scan passes shall view entire SSV with cameras at approximate full zoom in during final scan.

ETM Town Ford Date 3.8.01

Not Performed: NA

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### Terminal Count Camera Positions

#### NOTE

This step performed for SSME ignition only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute count. Cameras must be positioned for ignition no later than T-9 minutes. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM1 camera positions for SSME ignition are defined in Table 60-1.

60-11 CVM1 JTV1 223

Ref Table 60-1, **position** cameras 004/104, 013/113, 042/142, 054/154, 060/160, 062/162 for terminal count.

Support: COMM

ETM Tom Ford Date 3-8-01

Not Performed: NA

60-12 Completion of this operation satisfies noted OMRS requirements.

OMRSD S00FB0.005-1  
OMRSD S00L00.150

USA  
O/O

ETM Tom Ford Date 3-8-01

60-13 Operation - Group 1 Monitoring - LO<sub>2</sub> Chill Down Thru T-0 complete.

ME  
10

3/8/1

**Table 60-1 CVM1 Camera Positions for Terminal Count**

**NOTE**

This Table defines CVM1 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition non-sequentially.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

The GO<sub>2</sub> Vent Arm (GVA) retracts at T-2m30s.

**CVM1 Camera Positions Are Defined As Follows:**

**004/104**

GUCP centered in frame so that GUCP will stay in view throughout SRB "twang".

**042/142**

At approximately T-1 hour, view and monitor Orbiter access arm while Orbiter hatch is being closed.

At **T-7m30s**, watch Orbiter access arm retract, then view bipod strut in center of frame, LO<sub>2</sub> feedline fairing in top of frame, and Orbiter hatch in right of frame.

**054/154**

At **T-3m50s**, view Orbiter right hand body flap movement, then zoom out with Orbiter/ET umbilicals at approximate frame center, Orbiter trailing edge at frame bottom, and edge of +Y (RH) SRB just in view at frame right.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Table 60-1 CVM1 Camera Positions for Terminal Count**

**013/113**

At T-2m30s, watch lift of GO<sub>2</sub> vent arm for debris and nose cone/vent louvers for ice damage. Immediately following lift of GO<sub>2</sub> vent arm, center frame on GO<sub>2</sub> vent louver and then zoom-out so that entire ET movement is seen during SRB 'twang' at SSME ignition.

**060/160**

At approximately T-2m30s, after GO<sub>2</sub> vent arm retracts, go full zoom in for a close-up inspection of the GO<sub>2</sub> vent louver. After CICE concurrence, go full zoom out and position camera with SSV centered and ET nose cone at frame top.

**062/162**

At approximately T-2m30s, after GO<sub>2</sub> vent arm retracts, go full zoom in for a close-up inspection of the -Y GO<sub>2</sub> vent louver. After CICE concurrence, zoom out until ET nose spike is at top of frame with ET centered.

**061/161**

At approximately T-4m00s, verify camera lights are off. Then position camera to view astronaut closing visor at T-2 minutes 00 seconds.

**068/168 and 069/169**

Immediately after GO<sub>2</sub> vent hood lift, turn lights off to preclude distracting orbiter crew when the GVA rotates to its latchback position.

**\*\*\* End of Table 60-1 Camera Positions for Terminal Count \*\*\***

**\*\*\* End of Operation 60 \*\*\***

ET  
01  
3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**OPERATION 70 Group 2 Monitoring - LH<sub>2</sub> Chill Down Thru T-0**

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

**NOTE**

Do not perform this operation if launch scrub declared before start of LH<sub>2</sub> Chill Down.

Operation Not Performed: N/A

**NOTE**

This operation monitors LH<sub>2</sub> Barrel and associated components/areas start of LH<sub>2</sub> Chill Down to pre-pressurization via OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

Steps in this operation are contingent upon progression of launch countdown operations and may be not performed if countdown is terminated.

Noted requirements satisfied by completion of this operation.

OMRS S00FB0.005-1

OMRS S00FB0.360-1

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### LH<sub>2</sub> Chill Down To L-2 Hour Mark

70-1 CVM2 JYVR 138

At start of LH<sub>2</sub> Chill Down, start recorders for cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167.

ETM 

ME
08

 Date 3-7-01

Support: COMM

70-2

Record LH<sub>2</sub> Chill Down start date and time (GMT).

(90007 16-0015) EXCH NOTE 

ME
08

 3-7-01

LH<sub>2</sub> Chill Down Date 3-7-01 Time 02:17 GMT

ETM 

ME
08

 Date 3-7-01

70-3 CVM2 JTV2 225

From start of propellant loading until start of LH<sub>2</sub> Fast Fill on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, **monitor/videotape** ET-TPS surfaces. No cryogenic liquid or excessive vapors allowed.

ETM 

ME
08

 Date 3-7-01

Support: COMM

Not Performed: N/A

ME
10

3/8/1

70-2

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

70-4

Record LH<sub>2</sub> Slow Fill start date and time (GMT).

(5007) EXCL NOTE  
(16-0028) ME 08 3-7-01

LH<sub>2</sub> Slow Fill Date 3-7-01 Time 02:26 GMT

ETM ME 08 Date 3-7-01

Not Performed: N/A

70-5

Record LH<sub>2</sub> Fast Fill start date and time (GMT).

(5007) EXCL NOTE  
(16-0037) ME 08 3-7-01

LH<sub>2</sub> Fast Fill Date 3-7-01 Time 03:12 GMT

ETM ME 08 Date 3-7-01

Not Performed: N/A

70-6

CVM2 JTV2 225

From start of LH<sub>2</sub> Fast Fill until stable replenish mode is established, scan LH<sub>2</sub> Tank. Alternate OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167 and scan/videotape from LH<sub>2</sub> Aft Dome to Intertank.

ETM R. Sear Date 3/7/01

Support: COMM

Not Performed: N/A

70-3

ME 08

3/7/01



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

70-7

Record start date and time (GMT) for LH<sub>2</sub> Topping.

LH<sub>2</sub> Topping Date 3/8/01 Time 04:17 GMT

ETM ET  
01 Date 3/7/01

Not Performed: N/A

70-8 Record LH<sub>2</sub> Stable Replenish mode start date and time (GMT).

LH<sub>2</sub> Stable Replenish Date 3/8/01 Time 04:55 GMT

ETM ET  
01 Date 3/7/01

Not Performed: N/A

70-9 CVM2 JTV2 225

During LH<sub>2</sub> Stable Replenish mode and until time for final scan (approximately L-1.5 hours), on OTV cameras 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 067/167, **monitor/videotape** ET TPS surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, and TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals. No cryogenic liquid or excessive vapors allowed.

ETM ME  
10 Date 3/8/01

Support: COMM

Not Performed: N/A

ME  
10  
3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### Final SSV Inspection Scan

#### NOTE

Final SSV Inspection Scan should begin not later than 1.5 hours prior to start of T-9 minute hold (approximately L-2 hours) to allow ample time to finish. Final SSV Inspection Scan shall include the ET, SRB's and the Orbiter.

Final SSV Inspection Scan may be altered or partially performed in the event that time constraints will not permit a complete SSV scan prior to start of T-9 minute hold.

70-10 CVM2 JTV2 225

**Perform** Final SSV Inspection Scan with OTV cameras 009/109, 033/133, 054/154, 055/155, 056/156, 065/165, 066/166 and 064/164. Scan passes shall view entire SSV with cameras at full zoom in during final scan.

ETM



Date

3/8/11

Support: COMM

Not Performed: NA



3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### T-9 Minute Terminal Count

#### NOTE

Next step performed for terminal count only and may be not performed if launch is scrubbed prior to pick-up of T-9 minute terminal count. Cameras must be positioned for SSME ignition no later than T-9 minutes. 'Spot' scanning after pick-up of the T-9 minute terminal count is acceptable with CICE concurrence.

Cameras may be positioned for SSME ignition in an arbitrary order.

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for OTV operators to rehearse camera movements.

CVM2 camera positions for terminal count are defined in Table 70-1.

70-11 CVM2 JTV2 225

Ref Table 70-1, **position** cameras 009/109, 033/133, 056/156, 065/165, 066/166 061/161, 070/170, 071/171 and 067/167 for terminal count.

Support: COMM

ETM

ME  
10

Date

3/8/11

Not Performed: NA

70-12 Completion of this operation satisfies noted OMRS requirements.

OMRSD S00FB0.005-1  
OMRSD S00FB0.360-1

USA  
MM  
070

ETM

ME  
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Date

3/8/11

70-13 Operation - Group 2 Monitoring - LH<sub>2</sub> Chill Down Thru T-0 complete.

ME  
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3/8/11

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

Table 70-1 - CVM2 Camera Positions for Terminal Count

**NOTE**

This Table defines CVM2 camera positions for terminal countdown. Cameras should be positioned for ignition no later than pick-up of T-9 minutes count. "Spot" scanning after pick-up of the T-9 minute count is acceptable with CICE concurrence.

The Orbiter access arm (OAA) retracts at T-7M30S. Orbiter body flap movement occurs at T-3m50s.

Cameras may be positioned for SSME ignition non-sequentially

Camera positions may be altered real-time with CICE concurrence. Alterations should be determined prior to pick-up of T-9 minute count to allow sufficient time for operators to rehearse camera movements with ice console.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Group 2 Camera Positions Are Defined As Follows:**

**033/133**

Full zoom out. LO<sub>2</sub> feed line in frame center and MLP deck at bottom.

**055/155**

View ET aft dome with MLP deck just out of view at bottom, ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

**056/156**

View ET aft dome with MLP deck just out of view at bottom. ET XT-2058 ring frame at frame top and both SRB's just in view at sides.

**065/165**

Full zoom out. SSV centered. MLP deck edge just in view at bottom.

**066/166**

ET centered. Intertank to LO<sub>2</sub> Barrel splice at frame top with the majority of Orbiter wing in view.

**067/167**

Center on GUCP for optimum view.

**070/170 and 071/171**

At T-9m00s, zoom in on space shuttle main engine with camera providing best view. Zoom out on SSME for wide angle view with other camera.

**009/109**

At approximately T-3m50s, position to view Orbiter body flap and elevons movement. Afterwards, center on LH<sub>2</sub> umbilical with -Y vertical strut at frame top.

**061/161**

At approximately T-1m30s, tilt-up to GO<sub>2</sub> Vent Footprint. Zoom in. Pause. If footprint is acceptable, zoom out and tilt down to view Orbiter nose/cockpit through liftoff.

\*\*\* End of Table 70-1 - CVM2 Camera Positions for Terminal Count \*\*\*

\*\*\* End of Operation 70 \*\*\*

ET  
01  
3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 80 Final Inspection

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 3.0

#### NOTE

Final Inspection may not need to be performed depending on LO<sub>2</sub>/LH<sub>2</sub> tanking and launch countdown, as determined by CTC/TTL.

Final Inspection Team stay time guidelines for each level are given in Table 80-1. These guidelines are for reference only and may be deviated from at PICE discretion.

Operation Not Performed: NA

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

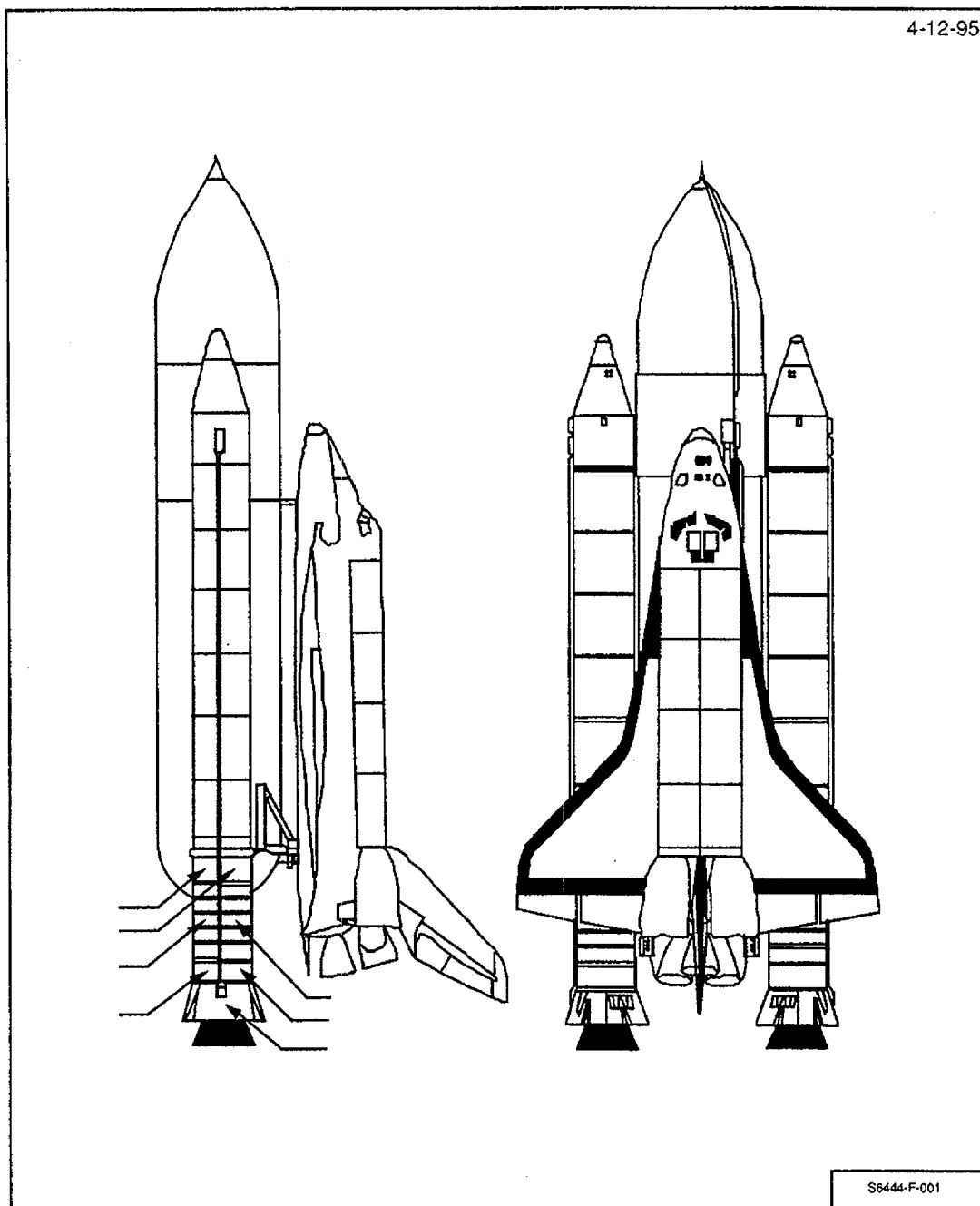


Figure 80-1: Deck (0) Level  
(For Reference Only)

EF  
01  
3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

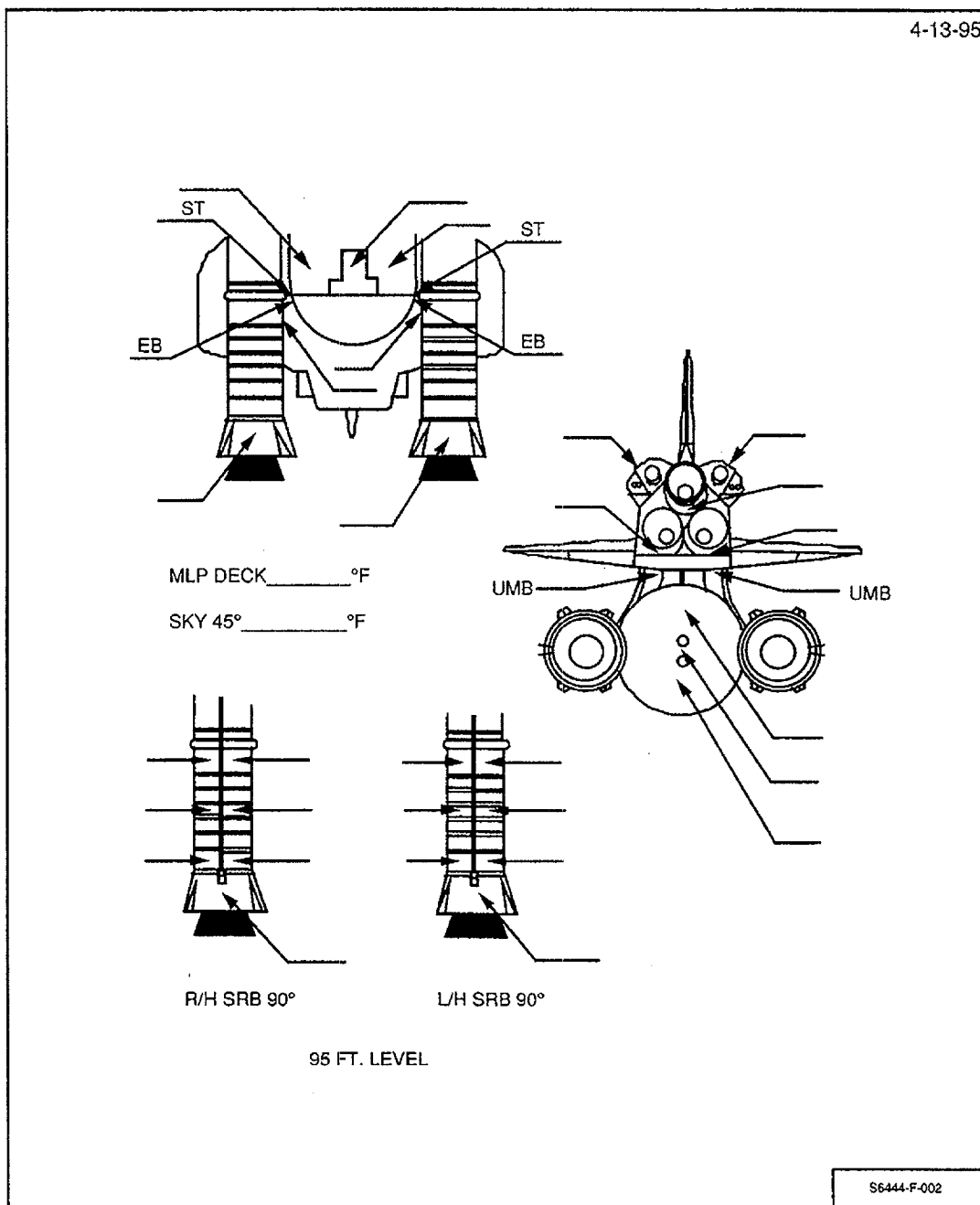
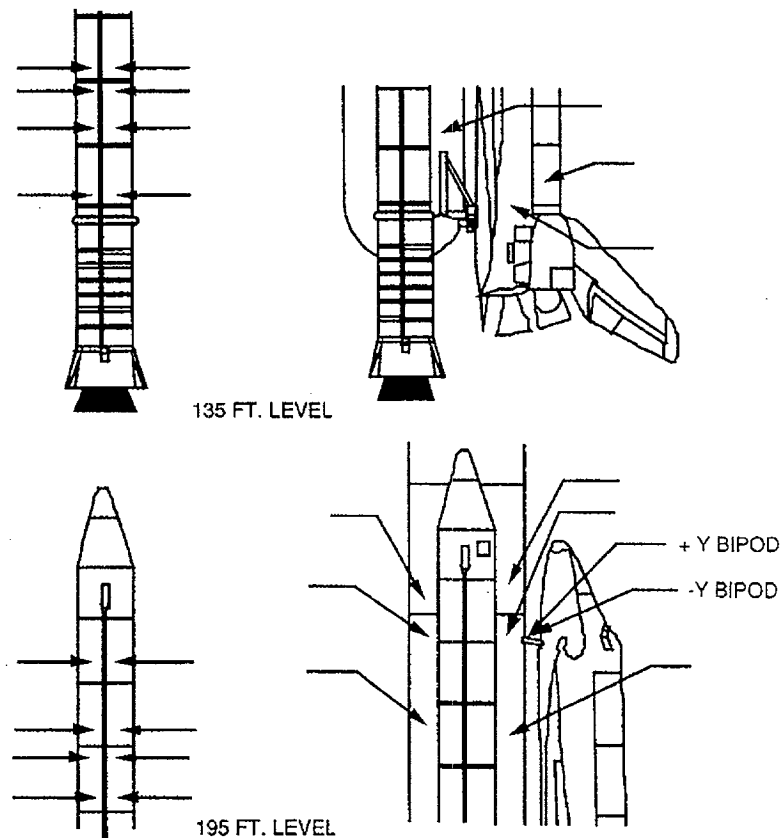


Figure 80-2: Deck (0) and 95 Ft Levels  
(For Reference Only)



4-12-95



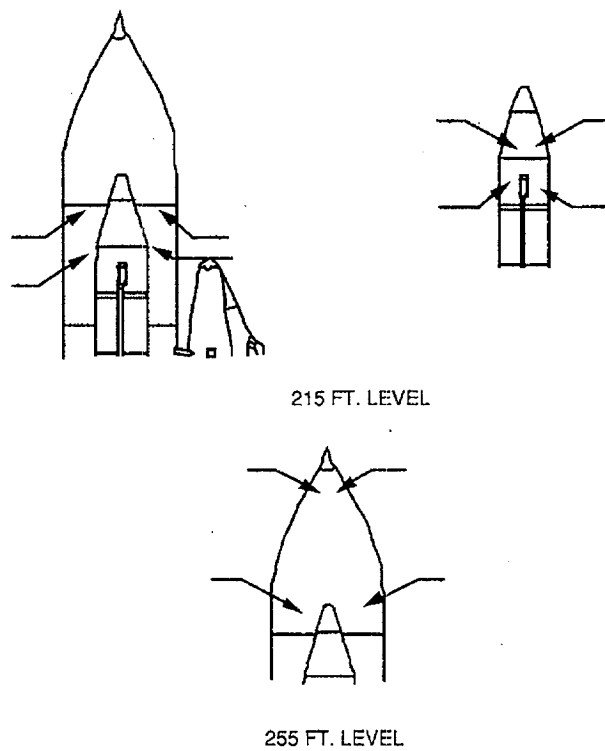
S6444-F-003

Figure 80-3: 135 and 195 Ft Levels  
(For Reference Only)

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

4-12-95



S6444-F-004

Figure 80-4: 215 and 255 Ft Levels  
(For Reference Only)

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**WARNING**

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

**WARNING**

Personnel performing final inspection shall be attired in **Nomex coveralls with gloves and hoods**. Personnel shall have available gloves, hoods, and **ELSA** at all times during walkdown.

Personnel using Sony DKC-ID1 camera shall verify lithium ion battery is securely locked in bayonet connector and the lithium button battery door is locked and taped in place. Personnel shall ensure the flash is not activated on the camera.

Personnel using Kodak DC-50/120 shall verify alkaline batteries are properly installed and the flash is not active on the camera.

Personnel using digital cameras (Sony DKC ID1, Kodak DC-50/120 shall not use these cameras in the presence of a hydrogen leak or an oxygen enriched atmosphere (readings greater than 23 percent O<sub>2</sub>).

**NOTE**

Task Team Leader (TTL) for final inspection is PH-H. Additional personnel (listed below) may be added to the final inspection team with CTC, Launch Director, and Safety concurrence.

JSC Level II	(1)
PH-H	(2)
SFOC ETM	(1)

ET  
01  
3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

80-1 Assemble following final inspection team members:

TTL - PH-H	(1)
PH-H	(1)
SFOC ETM	(2)
LMSSC LSS	(1)
SFOC Safety	(1)

80-2 Final inspection team **perform** walkdown of SSV and associated facilities as follows:

**NOTE**

Tables 80-2 and 80-3 are reference only items. Images are to be taken of targets of opportunity. Images must be taken with 35 mm and digital cameras. Digital images shall be inputted into SIMS.

1. Ref Tables 80-2 and 80-3, photograph SSV points of opportunity during final inspection using 35 mm. **Record** data.

Roll No. 1

Negative No. 1-36

Work order No. E106

2. Reference Tables 80-2 and 80-3, **take** digital image of SSV points of opportunity using digital camera.

Description: Final Inspection Team

3. See Figures 80-1 through 80-4, **measure and record** (deg F) SSV external surface temperatures using IR gun(s)/scanners.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

The following substep references inspection areas. However, inspection shall not be limited to these areas. Inspection shall be of entire SSV and specific areas of concern as defined by the TTL, CTC, or Launch Director.

**4. Visually inspect:**

- Orbiter aft engine compartment external surfaces for condensation and ice formations.
- ET TPS surfaces which cannot be observed by the OTV system.
- Specific areas of concern as determined by the TTL, CTC, or Launch Director.

OMRSD S00U00.020-A-1

OMRSD S00U00.020-C-1

OMRSD S00U00.020-D-1

USA  
VM  
070

**80-3** Final Inspection complete. **Verify** no constraints to continue.

TTL (PH-H) *[Signature]* Date 3/8/01

SFOC-ETM                       Date 3/8/01

**80-4** Operation - Final Inspection complete.

ETM                       Date 3/8/01

 3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**Table 80-1 Final Inspection Team Walkdown Stay Times**

**255 Ft Level - 5 Minutes**

- LO<sub>2</sub> Ogive and Barrel acreage
- GO<sub>2</sub> Pressurization Line
- LO<sub>2</sub> Tank Cable Tray
- Visible LH SRB surfaces
- GO<sub>2</sub> Vent Ducts

**215 Ft Level - 20 Minutes**

- ET GH<sub>2</sub> 7 inch Vent Assembly
- ET acreage (between -Z and -Y axis)
- GO<sub>2</sub> vent area
- Orbiter tiles
- Visible SRB surfaces
- Inter tank-to-LO<sub>2</sub> Barrel splice

**195 Ft Level - 10 Minutes**

- LO<sub>2</sub> Feed Line
- ET/Orbiter Bipods (side and bottom view)
- -Y ET/SRB forward attachment (bottom view)
- -Y ET/SRB aft attachments (top view)
- Inter tank splice areas (LO<sub>2</sub> and LH<sub>2</sub>)
- ET acreage (between -Y and +Z axis)
- Orbiter tiles
- Visible LH SRB surfaces

**135 Ft Level - 10 Minutes**

- LH<sub>2</sub> ET/Orbiter Umbilical
- -Y ET/SRB C/T
- -Y Vertical Strut
- LO<sub>2</sub> Feed Line
- ET acreage between -Y axis and +Z axis
- ET/Orbiter attachments (top view)
- Visible LH SRB surfaces
- Orbiter aft fuselage

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**Table 80-1 Final Inspection Team Walkdown Stay Times**

**0 Level - 30 Minutes**

- LH<sub>2</sub> Aft Dome
- ET acreage around +Z axis
- ET acreage around -Z axis
- LO<sub>2</sub> Feed Line
- LH<sub>2</sub> Feed Line
- ET/Orbiter attachments - Bottom view
- ET/Orbiter LH<sub>2</sub> and LO<sub>2</sub> Umbilicals
- T-0 LH<sub>2</sub> and LO<sub>2</sub> Umbilicals
- Space Shuttle Main Engines (SSME)
- Orbiter tiles
- ET/SRB aft attachments
- Visible SRB surfaces
- SRB ignition overpressure sound suppression water troughs

\*\*\* End of Table 80-1- Final Inspection Team Walkdown Stay Times \*\*\*

ET  
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Table 80-2 Final Inspection Team - Telephotos

**TELEPHOTOS - 255 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	Horizontal	
LO <sub>2</sub> Acreage	Vertical	

**TELEPHOTOS - 215 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
-Y Bipod Ramp	Horizontal	From RSS
LO <sub>2</sub> P/L Ice Frost Ramps	Vertical	From RSS; Requires 3-4 shots
GO <sub>2</sub> Seal/Hood	Horizontal	From haunch & RSS
GUCP	Vertical	

**TELEPHOTOS - 195 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
-Y Bipod Ramp & Jack PAD C/O	Horizontal	

**TELEPHOTOS - 135 FT LVL**

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	
-Y Longeron	Vertical	If needed
Jack Pad Closeouts	Horizontal	
LH <sub>2</sub> Acreage	Vertical	



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Table 80-2 Final Inspection Team - Telephotos

TELEPHOTOS - MLP

<u>Photo</u>	<u>Camera Orientation</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	From West
LH <sub>2</sub> UMB	Horizontal	From NW
EB-7	Horizontal	
EB-8	Horizontal	
LH <sub>2</sub> Aft Dome	Horizontal	
Third Hard Point C/O	Vertical	
LH <sub>2</sub> Barrel	Horizontal	From North
SSV Overall	Horizontal	From North
SSV Overall	Horizontal	From East
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1973
LO <sub>2</sub> F/L Bracket	Vertical	XT-1871
LO <sub>2</sub> F/L Bracket	Vertical	XT-1623
LO <sub>2</sub> F/L Bracket	Vertical	ST-1377 & XT-1129
LO <sub>2</sub> F/L Bracket & Bellows	Vertical	XT-1129 & XT-1106 from SE
LO <sub>2</sub> P/L & C/T	Vertical	From SE

600 MM PHOTOS - 255 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	1/30	Contingency

ET  
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Table 80-2 Final Inspection Team - Telephotos

600 MM PHOTOS - 215 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
-Y GO <sub>2</sub> Seal	1/30	
-Y Bipod Ramp	1/30	Contingency
Jack Pad C/O's	1/4	Difficult if windy
LO <sub>2</sub> F/L	1/15	
-Y Vertical Strut (Crack)	1/30	

600 MM PHOTOS - 195 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
-Y Bipod Ramp	1/30	Contingency

600 MM PHOTOS - 135 FT LVL

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
LH <sub>2</sub> UMB	1/30	
-Y Vertical Strut (Crack)	1/60	
LO <sub>2</sub> F/L Bellows	1/15	Contingency

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Table 80-2 Final Inspection Team - Telephotos

600 MM PHOTOS - MLP

<u>Photo</u>	<u>Shutter Speed</u>	<u>Notes</u>
LH <sub>2</sub> UMB	1/30	From West
LH <sub>2</sub> UMB	1/30	From NW
LH <sub>2</sub> UMB	1/30	From East
LH <sub>2</sub> UMB Actuator C/O	1/15 or 1/30	From North standing next to water pipe
LO <sub>2</sub> UMB	1/5	Lower Inboard
LO <sub>2</sub> UMB	1/8	Inboard
LO <sub>2</sub> F/L Bracket & Bellows	1/15	One photo to include XT-1978 & XT-1973
LO <sub>2</sub> F/L Bracket	1/15	XT-1871
LO <sub>2</sub> F/L Bracket	1/15	XT-1623
LO <sub>2</sub> F/L Bracket	1/15	XT-1377
LO <sub>2</sub> F/L Bracket	1/30	One photo to include XT-1129 & XT-1106
LO <sub>2</sub> F/L Bracket	1/30	From SE corner; One photo to include XT- 1129 & XT-1106
Jack Pad C/O's	1/15	From SE corner
Ice Frost Ramps or Pal Ramps	1/15 or 1/30	Contingency
LH <sub>2</sub> UMB Inboard	1/15	From East
+Y Longeron	1/15 or 1/30	Contingency
-Y Longeron	1/15	Contingency

ET  
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Table 80-2 Final Inspection Team - Telephotos

WIDE ANGLE PHOTOS - 255 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LO <sub>2</sub> Tank	Vertical	35-70 mm	
GO <sub>2</sub> Vent Ducts	Horizontal	35-70 mm	

WIDE ANGLE PHOTOS - 215 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Overall GH <sub>2</sub> Vent Line	Horizontal	35-70 mm	
Orbiter Nose, ET -Y Side	Horizontal	35-70 mm	
Orbiter Nose, ET -Y, +Z Side	Horizontal	35-70 mm	From RSS
Forward Half of Vehicle	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

WIDE ANGLE PHOTOS - 195 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Aft Part of SSV, LH Wing	Vertical	35-70 mm	
Orbiter Fwd Section, Upper LH <sub>2</sub> Tank	Vertical	35-70 mm	
Bipod, -Y, +Z Intertank Area	Horizontal	35-70 mm	

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Table 80-2 Final Inspection Team - Telephotos

WIDE ANGLE PHOTOS - 135 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Orbiter Aft Section	Vertical	35-70 mm	
Lower LH <sub>2</sub> Tank & LH SRB	Vertical	35-70 mm	

WIDE ANGLE PHOTOS - MLP

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
Overall Orbiter Left Side	Vertical	28 mm	
ET -Y, +Z Quadrant	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
ET +Y, +Z Quadrant	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
ET Aft Dome	Horizontal	35-70 mm	
-Z Side of LO <sub>2</sub> T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LO <sub>2</sub> T-0; RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
-Z Side of LH <sub>2</sub> T-0; RCS Stinger	Horizontal	35-70 mm	
+Z Side of LH <sub>2</sub> T-0; RCS Stinger OMS Nozzle	Horizontal	35-70 mm	
Overall SSME Cluster	Horizontal	50 mm	-Y Side
SSME No. 2	Horizontal	50 mm	
SSME No. 1, -Z Side	Horizontal	50 mm	
SSME No. 3	Horizontal	50 mm	

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**Table 80-2 Final Inspection Team - Telephotos**

Overall SSME Cluster	Horizontal	50 mm	+Y Side
LO <sub>2</sub> UMB Area	Horizontal	35-70 mm	
LH <sub>2</sub> UMB Area	Horizontal	35-70 mm	
ET/ORB UMB & ORB Lower Surface	Horizontal	28 mm	From under ET

\*\*\* End of Table 80-2 Final Inspection Team - Telephotos \*\*\*

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Table 80-3 Reduced Final Inspection Team Photos

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 255 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
GO <sub>2</sub> Vent Ducts	TELE	Horizontal	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 215 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
-Y Bipod Ramp	Horizontal	TELE	From RSS
LO <sub>2</sub> P/L Ice/Frost Ramps	Vertical	TELE	From RSS; 2 photos required
GO <sub>2</sub> Seal/Hood	Horizontal	TELE	From RSS
GUCP	Vertical	TELE	
Fwd Half of SSV	Vertical	28 mm	From RSS
Entire Orbiter	Vertical	28 mm	From RSS

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 195 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
-Y Bipod Ramp & Jack Pad C/O's	Horizontal	TELE	

ET  
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01-15-2001  
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Table 80-3 Reduced Final Inspection Team Photos

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - 135 FT LVL

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	TELE	
Orbiter Aft Section	Vertical	35-70 mm	

WIDE ANGLE & TELEPHOTO PHOTOGRAPHY - MLP DECK

<u>Photo</u>	<u>Camera Orientation</u>	<u>Lens</u>	<u>Notes</u>
LH <sub>2</sub> UMB	Horizontal	TELE	From West
ET Aft Dome	Horizontal	TELE	
Aft Hard Point Closeout	Vertical	TELE	
LH <sub>2</sub> Tank	Horizontal	TELE	From North
LO <sub>2</sub> Tank	Horizontal	TELE	From North
LO <sub>2</sub> Tank	Horizontal	TELE	From East
LO <sub>2</sub> F/L Bracket Bellows	Horizontal	TELE	XT - 1978 & XT - 1973
LO <sub>2</sub> F/L Bracket	Horizontal	TELE	XT - 1871
LO <sub>2</sub> F/L Bracket	Horizontal	TELE	XT - 1623
LO <sub>2</sub> F/L Brackets	Horizontal	TELE	XT - 1377 & XT - 1129
LO <sub>2</sub> F/L Brackets & Bellows	Horizontal	TELE	XT - 1129 & XT - 1108; from SE
LO <sub>2</sub> P/L & C/T	Horizontal	TELE	From SE
Overall Orbiter Left Side	Vertical	28 mm	
ET -Z Side	Vertical	28 mm	
Overall Orbiter Right Side	Vertical	28 mm	
Overall SSME Cluster -Y Side	Horizontal	28 mm	



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**Table 80-3 Reduced Final Inspection Team Photos**

Overall SSME Cluster +Y Side	Horizontal	28 mm	
ET/Orb UMB & Orbiter Lower Surface	Horizontal	28 mm	From under ET

\*\*\* End of Table 80-3 - Reduced Final Inspection Team Photos \*\*\*

\*\*\* End of Operation 80 \*\*\*

ET  
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3/8/01

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## OPERATION 90 LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 4.0

### NOTE

This operation is contingent upon progression of launch countdown and is performed after start of cryo (LO<sub>2</sub>/LH<sub>2</sub>) loading and subsequent launch scrub, FRF, or WCDDT.

Operation Not Performed: ME  
10 3/8/01

### NOTE

This operation monitors the External Tank external surfaces during LO<sub>2</sub>/LH<sub>2</sub> drain operations from time of detanking until 1.5 hours after LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry via OTV 004/104, 009/109, 013/113, 033/133, 042/142, 054/154, 055/155, 056/156, 060/160, 061/161, 062/162, 063/163, 064/164, 065/165, 066/166, 067/167, 068/168, 069/169, 070/170, and 071/171.

Noted requirements satisfied by this operation: OMRS S00E00.021

90-1 Record start date/time (GMT) of LH<sub>2</sub> and LO<sub>2</sub> Tank Drain.

LH<sub>2</sub> Drain Start Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

LO<sub>2</sub> Drain Start Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

90-1

ET  
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3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

90-2 CVM1 JTV1 223

From start of LO<sub>2</sub> Tank Drain and LH<sub>2</sub> Tank Drain until respective LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry, **monitor** ET external surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals via OTV cameras. No cryogenic liquid or excessive vapors allowed.

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

90-3 **Record** date/time (GMT) when LO<sub>2</sub>/LH<sub>2</sub> low level sensors read dry.

LH<sub>2</sub> Sensors Dry Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

LO<sub>2</sub> Sensors Dry Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

ET  
01

3/8/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

90-4 CVM1 JTV1 223

Monitor ET external surfaces including LO<sub>2</sub> Feed Line, LH<sub>2</sub> Feed Line, LH<sub>2</sub> Recirculation Line, LH<sub>2</sub> Aft Dome and manhole covers, LH<sub>2</sub>/LO<sub>2</sub> Umbilicals, TSM LH<sub>2</sub>/LO<sub>2</sub> Umbilicals via OTV cameras for 1.5 hours after LO<sub>2</sub>/LH<sub>2</sub> low level sensors have read dry. No cryogenic liquid or excessive vapors allowed. Record date/time (GMT) when monitoring complete.

LH<sub>2</sub> Complete Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

LO<sub>2</sub> Complete Date \_\_\_\_\_ Time \_\_\_\_\_ GMT

ETM \_\_\_\_\_ Date \_\_\_\_\_

Support: COMM

90-5 Completion of this operation satisfies noted requirements.

USA  
VM  
070

OMRSD S00E00.021

90-6 Operation - LO<sub>2</sub>/LH<sub>2</sub> Drain Monitoring complete.

\*\*\* End of Operation 90 \*\*\*

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

## OPERATION 100 Console Securing

Shop: SE  
Cntrl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

### 100-1

CTIF	TBC	136
TBC	CTC	232

OTV support for ET thermal protection system evaluation no longer required.

### 100-2

CTIF	JYVR	138
------	------	-----

Perform the following:

1. Turn off video recorders.
2. Remove tape cartridges.
3. OTV support no longer required.

Support: COMM

### 100-3

CTIF	CVM1	222
	CVM2	

Secure consoles by setting all monitors to "Off" position.  
Report completion.

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

**NOTE**

Perform next step only after a successful launch.

100-4

**CTIF**

Remove photo processing laptop computer from Firing Room.

Not Performed: NA

100-5

<b>CTIF</b>	<b>TBC</b>	<b>136</b>
<b>TBC</b>	<b>CTC</b>	<b>232</b>

Firing Room 2, ice frost monitoring area securing complete.

100-6

Operation 100 - Console Securing complete.

ETM

ME  
10

Date

3/8/11

\*\*\* End of Operation 100 \*\*\*

ME  
10

3/8/11

100-2

01-15-2001  
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OMI S6444 J01  
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### OPERATION 110 Summary Tape

Shop: SE  
Cntl Rm Console: FR2  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 18.0

#### NOTE

Observations/concerns observed during count are typically recorded on the summary tape real-time (trouble tape).

#### 110-1 CICE

After launch or launch scrub, prepare a summary tape to include observations/concerns noted during count.

#### 110-2 Operation Summary Tape complete.

ETM A. Seale Date 3/8/01

\*\*\* End of Operation 110 \*\*\*

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 120 Post Drain Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 2.0

#### NOTE

Post drain walkdown performed only after start of cryo (LH<sub>2</sub>/LO<sub>2</sub>) loading and subsequent launch scrub.

Operation Not Performed: ME  
10 3/8/1

#### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel shall wear **hardhats** and **flame retardant coveralls** while performing post drain walkdown.

#### NOTE

Post drain walkdown typically commences approximately 1.5 hours after LH<sub>2</sub>/LO<sub>2</sub> low level sensors read dry.

Post drain walkdown performed in support of a 24 hour scrub turnaround is typically coincident with the L-20 hour pre-launch walkdown for the ensuing launch attempt.



01-15-2001  
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**NOTE**

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(4)
SFOC Engr	(2)
LMSSC-LSS	(1)
Boeing LSS	(1)
SFOC Safety	(1)

- 120-1** NASA Lead ET Mechanical Systems Engineer (PH-H) verify essential personnel on station, properly attired, and ready to proceed with post drain walkdown.

**Essential Personnel**

NASA Engineering (PH-H)	1
SFOC Engineering (ETM)	1

**NOTE**

"Hands-on Investigation" is applicable only to those areas which are not understood or fully defined and which cannot be adequately evaluated otherwise.

- 120-2** Perform post drain walkdown as follows:

- 1. Visually inspect** ET TPS exterior surfaces after detanking and warm-up (approximately T + 4 hours after drain is initiated) from the MLP, FSS, and RSS as access permits.
- 2. Perform** hands-on investigation of all areas suspected of violating Doc: NSTS 08303 (LI) NSTS PROGRAM ICE/DEBRIS INSPECTION CRITERIA (LI)

OMRSD S00E00.031

01/12/01

01-15-2001  
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OMI S6444 J01  
APPROVED

120-3 Walkdown complete. All discrepancies identified. No constraints to continue.

PH-H \_\_\_\_\_ Date \_\_\_\_\_

ETM \_\_\_\_\_ Date \_\_\_\_\_

120-4 Operation Post Drain Walkdown complete.

ET  
01  
3/12/01

\*\*\* End of Operation 120 \*\*\*

120-3

ET  
01  
3/12/01

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

### OPERATION 130 Post Launch Walkdown

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: PAD A/B  
Hazard (Y/N): Y  
Duration (Hrs): 3.0

#### NOTE

Do not perform this operation after launch scrub.

Operation Not Performed: NA

#### WARNING

Personnel working at heights greater than 4 feet and within 6 feet of an unguarded edge shall wear a **safety harness** with a **lanyard** secured to an approved tie off point, substantial structural member (no handrails) or a properly installed life line.

Personnel participating in walkdown shall wear **hardhats** and **flame retardant coveralls**.

#### NOTE

NASA ET Mechanical Engineer (PH-H) or designee shall function as team leader. Following personnel are walkdown optional participants:

NASA Engr	(3)
SFOC Engr	(2)
LMSSC-LSS	(1)
Boeing LSS	(2)
SRB ELE	(1)
Thiokol-LSS	(1)
SFOC Safety	(1)

01-15-2001  
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- 130-1 NASA (PH-H) **verify** following personnel on station, properly attired, and ready to proceed with post launch walkdown.

Essential Personnel		
NASA	PH-H	1
SFOC	ETM	1

- 130-2 **Perform** Post Launch Walkdown as follows:

1. Ref Table 130-1, **visually inspect** post launch pad/area to identify any lost flight or ground systems hardware and debris sources.
2. Ref Table 130-2, **document/SIMS photograph** launch PAD area configuration.

Description: Post Launch Walkdown

OMRSD S00U00.010-1

USA  
VM  
067

- 130-3 Walkdown complete. Debris sources and lost flight hardware identified. No constraints to continue.

PH-H *James E. Quinn* Date 3/29/01  
ETM *Mark A. Sallam* Date 3/8/01

- 130-4 Operation - Post Launch Walkdown complete.

ET  
01

3/29/01

01-15-2001  
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**Table 130-1 Post Launch Walkdown Inspection Areas**

Record mission info, PAD, date, and time:

STS 102

PAD B

Date 3/8/01

Time 0815-1015

**SRB Hold-down posts (HDP)**

Inspect for damage, stud hang-up Epon shim material, ordnance fragments, doghouse blast covers, erosion, missing hardware, debris. Record Results:

(SEE "STG-102 POST LAUNCH  
PAD DEBRIS INSPECTION REPORT"  
INSERT AFTER OP # 150)

R. Seale ETM 3/8/01

**MLP Deck**

SRB aft skirt purge lines  
SRB T-0 umbilicals  
Tail service masts (TSM's)  
MLP deck

**195 Ft Level**

Orbiter access arm (OAA)

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Table 130-1 Post Launch Walkdown Inspection Areas

215 Ft Level - GH2 Vent Line/GUCP

Latch position  
Loose cables  
Damage from SRB plume  
Damage to the QD

255 Ft Level - GO<sub>2</sub> Vent Arm, Ducts, Hood

Seals  
Hood windows, doors, latches

Fixed Service Structure (FSS)

Cable tray covers  
Signs  
Hydraulic leaks  
Slidewire baskets

PAD Apron/Acreage

Vehicle hardware and/or flight TPS materials  
Facility debris

Table K-1 PAD Apron/Acreage Items

<u>Description</u>	<u>Location</u>

\*\*\* End of Table 130-1 - Post Launch Walkdown Inspection Areas \*\*\*

ET  
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7/2/01

01-15-2001  
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**Table 130-2 Post Launch Photos (MLP, FSS, PAD, Apron, Pad Acreage)**

**MLP 0-level**

- 1 Ea HDP No. 1, 2, 5 & 6 (HDP shoe and Epon shim)
- 1 Ea HDP No. 3, 4, 7 & 8 (blast cover down to HDP base)
- 1 Ea SRB T-O umbilical
- 1 Ea overall view SRB exhaust cutouts\

Any unusual or debris-related damage to the facility; sound suppression water pipes, TSM's cracks in MLP deck, witness panels, handrails, etc.

Any flight hardware debris (tiles, SRB ordnance fragments)  
Any facility debris (nuts, bolts, cable tray covers, etc.)

**FSS**

- Close-ups of GUCP and latching mechanism
- Overall views of GO<sub>2</sub> vent hood/ducts, if damaged
- Any flight hardware or facility debris
- Any unusual or debris-related damage to the facility

**PAD Apron/PAD Acreage**

Any flight hardware or unusual facility debris objects

Any unusual or debris-related damage to the PAD (such as missing brick in the flame trench), perimeter fence, etc.

**\*\*\* End of Table 130-2 - Post Launch Photos (MLP, FSS, PAD, Apron, Pad Acreage) \*\*\***

**\*\*\* End of Operation 130 \*\*\***

01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

## OPERATION 140 Film Review

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 15.0

### NOTE

This operation may be not performed after launch scrub.

Operation 140 Not Performed: NA

140-1 Review engineering films for FOD issues, launch anomalies, or other discrepancies.

140-2 Operation - Film Review complete.

ETM

R. Seae

Date 3/27/01

\*\*\* End of Operation 140 \*\*\*

140-1

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3/27/01



01-15-2001  
APPROVED

OMI S6444 J01  
APPROVED

## OPERATION 150 Final Report

Shop: SE  
Cntrl Rm Console: NA  
OPR: ETM  
Zone: NA  
Hazard (Y/N): N  
Duration (Hrs): 0.5

### NOTE

This operation may be not performed after launch scrub.

Operation 150 Not Performed: NA

- 150-1 Assemble final report by attaching following reports to this OMI.  
Reference each to this step.

Post Launch PAD Assessment  
SRB Assessment  
Launch Film Review  
Launch Day Video Review  
Orbiter Landing Assessment  
ET Separation Review

- 150-2 Final report assembly complete.

ETM A. Sena Date 3/27/01

OMRSD S00U00.011-1 <sup>0.5</sup><sub>0.5</sub>

- 150-3 Operation - Final Report complete.

\*\*\* End of Operation 150 \*\*\*

STEP 150-1 / TABLE 130-1

STS-102 POST LAUNCH PAD DEBRIS INSPECTION REPORT  
KSC Debris Team  
08 March 2001

The post launch inspection of the MLP-3, Pad B FSS and RSS was conducted on 08 March 2001 from Launch + 2 to 4 hours (0815 to 1015 EST). No flight hardware was found.

Orbiter liftoff lateral acceleration data to predict stud hang-ups received from Boeing-Huntington Beach indicated that no SRB holddown stud hang-up had occurred. A HIM card failure prevented Debris team close-up evaluation of the holddown posts, as MLP 0-level was closed (Nitrogen flowing).

Evaluation of the 0-level was performed from the FSS. Erosion was typical for the north posts. North holddown post blast covers and T-0 umbilical exhibited typical exhaust plume damage. Both SRB aft skirt GN2 purge lines were intact, protective tape layering was partially eroded.

The LO2 and LH2 Tail Service Masts (TSM) appeared undamaged and the LO2 bonnet was observed to have closed properly. The MLP deck was in generally good shape.

The GH2 vent line latched in the third of eight teeth of the latching mechanism. The GUCP 7-inch QD sealing surface exhibited no damage, the lip had a dent at the bottom-most location (6 o'clock position). The spool weldment strut had contacted the left-hand latch assembly. The latch was bent slightly. The left-hand side of the GH2 vent line arresting cable was noticeably frayed on the outer surface of the cable.

The OAA appeared to be intact with no evidence of plume impingement.

All slidewire baskets were secured with no evidence of damage.

The GOX vent arm, hood, ducts and structure appeared to be in good shape with no indications of plume damage.

Debris findings included:

- Three areas of damage (missing material) were noted on the north flame deflector.
- No flight debris was found on the Pad apron or adjacent grass.
- No unusual debris items were found on the FSS.

Overall, damage to the pad appeared to be minimal. Minimal debris was noted on pad apron and FSS.

Robert Speece NASA-KSC  
Mark Wollam USA-ETM

Juan Ramirez LMMSS  
Duane Leggett Boeing

ET  
01

3/8/01

# STEP 150-1

STS-102 LAUNCH DAY VIDEO REVIEW  
KSC Photo/Video Analysis Team  
8 March 2001

## Significant Anomalies

None

## Minor Anomalies

None.

## Funnies

None.

## Observations

- SSME Mach diamond formation sequence was 2-3-1. Normally, the sequence is 3-2-1. (OTV 151)
- Free burning hydrogen was visible near the orbiter base heat shield and rising past the vertical stabilizer. (OTV 170, 171, TV 4, 7, 21)
- Numerous pieces of ice from the ET/ORB umbilical shook loose and contacted umbilical sill tiles, but no damage was detected. (OTV 109, 163, 154)
- Nominal elevon movement was observed at SSME ignition. (OTV 109, 154)
- Purge barrier tearing loose was noted following SSME ignition. (OTV 109, 154)
- LH2 and LO2 T-0 umbilical disconnect was normal. (OTV 149, 150)
- Numerous pieces of SRB throat plug were ejected from the exhaust holes without contacting the Orbiter. (TV 4, 5, 7)
- Debris particle, forward of the -y thrust strut, seen falling aft shortly after SRB ignition. The length of the debris particle appears to be no more than 8 inches in length and no more than two inches in width. (OTV 109)
- Acreage frost pattern was observed on the LOX barrel and LH2 tank. (OTV 141, 160, 170, TV 4)

## Notes

A total of 19 out of 37 possible videos were made available for review. Review of long range tracking films and the remaining videos is scheduled to begin Friday morning, March 9, 2001.

Jorge Rivera  
NASA - KSC

Armando Oliu  
NASA - KSC

Abdi Khodadoust  
Boeing - Huntington Beach

ET  
01

3/8/01

STEP 150-1

STS-102 POST LAUNCH FILM REVIEW  
KSC Photo/Video Analysis Team  
09 March 2001

**Significant Anomalies**

None

**Minor Anomalies**

None

**Funnies**

None

**Observations**

- Several debris-induced streaks were observed in the SSME plume (E-54, E-220, E-222, E-223, E-224).
- Free-burning GH2 observed rising towards base of the vertical tail and near the body flap. (E-54, E-63, E-77)
- Numerous pieces of SRB throat plug material ejected from the SRB exhaust hole; none were observed to contact the Orbiter lower surface. (E-54, E-77, E-222).
- Particles of SRB aft-skirt instafoam fell along side the SRB plume (E-212). The amount and frequency of instafoam debris was less than what was observed during last mission.
- Body flap and elevon movement during ascent were typical (E-207, E-212, E-220).
- Facility debris observed passing through field of view well after the vehicle had cleared the tower. Quantity and size appeared to be less than typical. (E-63, E-76, E-77)
- Base heat shield movement during SSME ignition was typical (E-76, E-77).
- Ice particles fell from ET/ORB umbilicals after lift-off. No impact to orbiter lower surface was noted. (E-77)
- SRB separation appeared normal. The effect of forward RCS firing on the BSM plume during SRB separation was not visible. (E-207, E-212)
- NASA helicopter was observed west of the pad shortly after the vehicle cleared the tower. (E-52, E-54)
- Charring on the ET aft dome was typical. (E-52, E-54, E-207, E-222, E-224)
- Umbilical purge barrier baggy material fell shortly after T-0, and later after roll maneuver. (E-54)
- Debris particles, possibly purge barrier baggy, instafoam, or ET hydrogen fire detection paper, observed trailing aft near ET LH2 aft dome - between 11:42:24.819 UTC and 11:42:28.914 UTC. (E-54)
- SSME Mach diamond formation sequence was 2-3-1; normal sequence is 3-2-1. (E-76)
- Debris particles, probably forward RCS paper cover, were observed trailing aft in the vicinity of the left OMS pod just prior to SRB separation. (E-207)

**Notes**

Review of launch pad high-speed films will continue on Saturday, March 10<sup>th</sup> 2001.

Jorge Rivera  
NASA - KSC

Armando Oliu  
NASA - KSC

Abdi Khodadoust  
Boeing - Huntington Beach

ET  
01

3/9/01

STEP 150-1

STS-102 POST LAUNCH FILM REVIEW  
KSC Photo/Video Analysis Team  
10 March 2001

**SIGNIFICANT ANOMALIES**

None

**MINOR ANOMALIES**

None

**FUNNIES**

The spray pattern from the LH2 TSM south ROFI became intermittent during SSME startup. Films E-3 and E-20 will be shared with the pyro system personnel for their expert evaluation.

**OBSERVATIONS**

Acreage frost pattern was visible on the LOX and LH2 tanks. No change in the frost pattern had been observed from the OTV view during the final stages of the launch countdown.

Free-burning GH2 was observed rising towards orbiter base during SSME startup.

Several ice particles fell from ET/ORB umbilical during SSME ignition, none of the particles contacted the vehicle.

Vapors on ET aft dome and SRB stiffener rings were observed after T-0.

Ice particles fell from LH2 / LO2 TSM T-0 disconnects.

No stud hang up, or ordnance fragments, were observed on any of the SRB hold-down posts.

Multiple pieces of umbilical purge curtain (LH2 and LO2) were observed falling aft during SSME ignition, and during lift off. This is normally observed after the roll maneuver.

Piece of SRB aft skirt instafoam material broke off during lift off due to contact with shoe retainer bracket on hold down post #4 (E-7) (11:42:09.438 UTC). Another piece of instafoam broke off due to contact with hold down post #7 shoe (E-11) (11:42:09.595 UTC).

Small piece of water deluge pipe scale (surface coating) crossed the field of view close to the camera at T-0. (E-14)

Tile surface coating material was lost from several tiles on the Orbiter base heat shield outboard of SSME #2 and #3 as well as from the left hand RCS stinger. This is a common occurrence due to SSME ignition acoustics.

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3/12/01

STEP 150-1

Ice particles fell aft crossing field of view past the right hand wing from the RH SRB EB-fitting. No contact with the Orbiter lower surface was noted.

Two distinct flashes accompanied with trailing puffs, occurred in the vicinity of OMS pods. They appeared to be associated with OMS assist burn, shortly after SRB separation. (E-205)

NOTES

All delivered launch films have been reviewed at this time.

Jorge Rivera  
NASA - KSC

Armando Oliu  
NASA - KSC

Robert Speece  
NASA - KSC

Abdi Khodadoust  
Boeing-Huntington Beach

## STEP 150-1

STS-102 SRB POST FLIGHT/RETRIEVAL ASSESSMENT  
KSC Debris Team  
12 March 2000

The BI-106 Solid Rocket Boosters were inspected for debris damage and debris sources at CCAFS Hangar AF on 12 March 2001. Generally, both boosters were in excellent condition.

### ANOMALIES

None

### FUNNIES

None

### OBSERVATIONS

The TPS on both frustums exhibited no debonds/unbonds. There was minor localized blistering of the Hypalon paint.

All eight BSM aero heat shield covers had fully opened and locked.

The forward skirts exhibited no debonds or missing TPS. RSS antennae were intact. One pin retainer clip was bent up 90 degrees, but still installed in place.

The Field Joint Protection System (FJPS) and the System Tunnel Covers closeouts were generally in good condition with no unbonds observed.

Separation of the aft ET/SRB struts appeared normal.

Aft skirt external surface TPS was in good condition. Typical blistering of Hypalon paint had occurred on the BTA insulation closeouts and GEI cork runs.

The holddown post Debris Containment Systems (DCS) appeared to have functioned normally. No indication of stud hang up was observed.

Jorge Rivera  
NASA - KSC

STEP 150-1

STS-102 ORBITER POST LANDING INSPECTION  
PRELIMINARY DEBRIS ASSESSMENT  
21 March 2001

A runway walkdown and preliminary post landing inspection of OV-103 Discovery was conducted at the Kennedy Space Center on SLF runway 15.

The Orbiter lower surface sustained 42 total hits, of which 10 had a major dimension of 1-inch or larger, both numbers are well within family.

Approximately 12 damage sites (with two larger than 1-inch in length) were located in the area from the nose landing gear to the main landing gear wheel wells. The majority of the hits were around the LH2 umbilical area (22 hits). Most of these damage sites around the ET/ORB umbilical were most likely caused by pieces of the umbilical purge barrier flailing in the airstream and contacting tiles before pulling loose and falling aft. The ET TPS venting modifications continue to have a reducing effect on the quantity and size of the damage sites.

The largest lower surface tile damage site, located aft of the LH2 umbilical, measured 1-inch long by 2-inches wide by 0.125-inches deep. A combination of umbilical ice and/or umbilical purge barrier material could have been the cause of this damage site.

The landing gear tires were reported to be in good condition. There was no ply under cutting on the main landing gear tires.

One protruding tile gap filler material was found on the R/H OMS pod, approximately 2-inches long.

ET/Orbiter separation devices EO-1, EO-2, and EO-3 functioned normally. No ordnance fragments were found on the runway beneath the umbilicals. The EO-2 and EO-3 fitting retainer springs appeared to be in nominal configuration, though one of the "salad bowl" clips were missing from EO-3. The EO-2/3 pyro debris shutters were fully closed. A small piece of umbilical closeout foam (pyro can closeout) was adhered to the umbilical plate near the LO2 disconnect. No debris was found beneath the umbilicals.

Less than usual amounts of tile damage occurred on the base heat shield. All SSME Dome Heat Shield closeout blankets were in excellent condition.

No unusual tile damage occurred on the leading edges of the OMS pods. Two vertical tail leading edge tile damage sites were observed, with one appearing to have a major dimension greater than one inch.

Damage sites on the window perimeter tiles appeared to be less than usual in quantity and size. Hazing and streaking of forward-facing Orbiter windows appears to be less than normal. A more detailed inspection will be performed in the OPF.

The post-landing walkdown of Runway 15 was performed immediately after



## STEP 150-1

landing. All components(except for the mortar can cover seal ring) of the drag chute were recovered and appeared to have functioned normally. A piece of AMES gap filler, 10-inches long by 1-inch wide, was found on the runway, tiles gap filler have been found on previous missions and is not considered an anomaly. Numerous pieces of, what appears to be, facility paint chips were found right of centerline of runway 15. Largest pieces were approximately 3-inches x 2-inches.

Preliminary, the Orbiter TPS sustained a total of 63 hits, of which 10 had a major dimension of 1-inch or larger. This total does not include the numerous hits on the base heat shield attributed to SSME vibration/acoustics and exhaust plume recirculation.

The Orbiter post landing assessment will continue in OPF Bay 2 after towing and safing operations have been completed, presently scheduled for Thursday 03/22/01.

Jorge Rivera  
NASA - KSC

Armando Oliu  
NASA - KSC

Robert Speece  
NASA - KSC

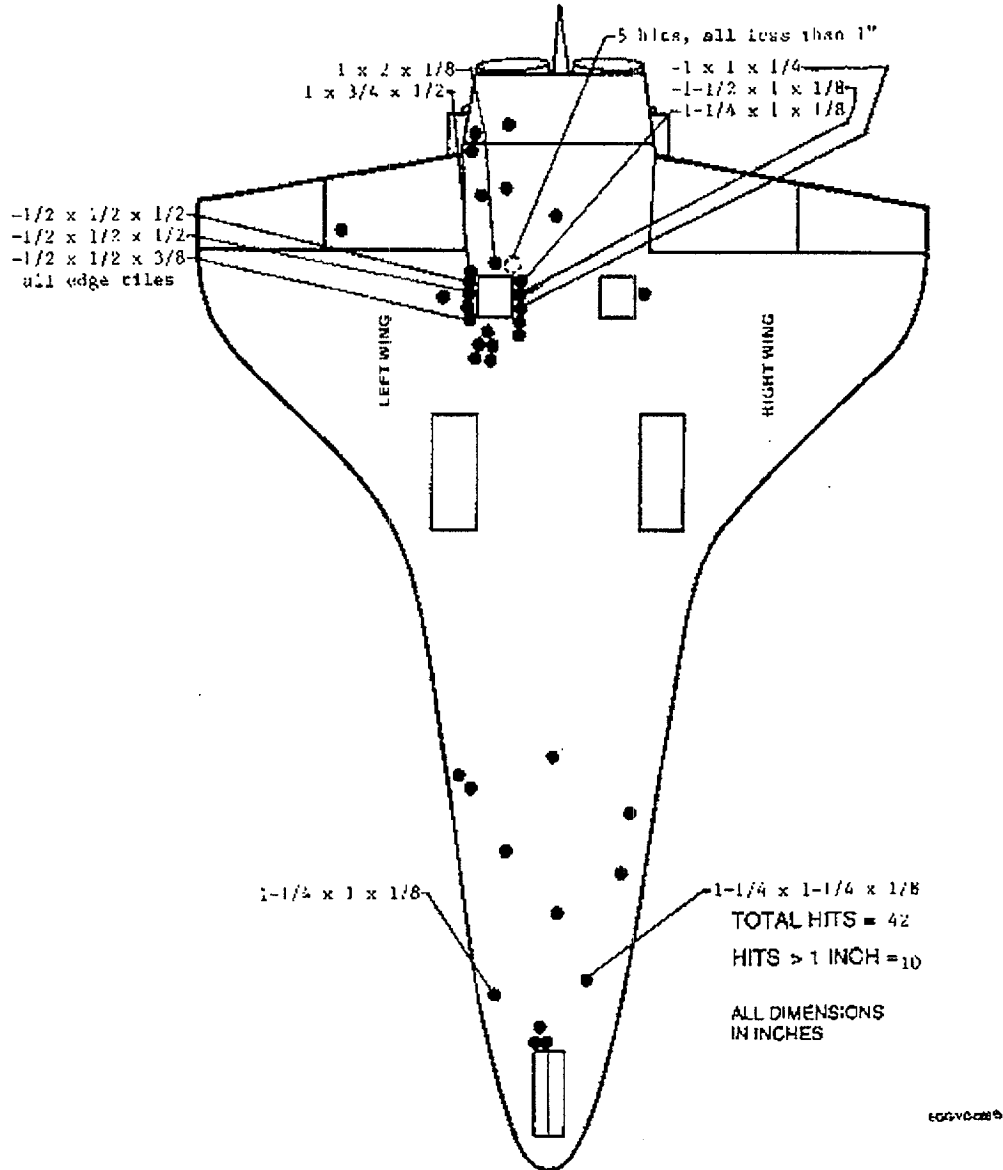
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STEP 150-1

STS-102

# DEBRIS DAMAGE LOCATIONS



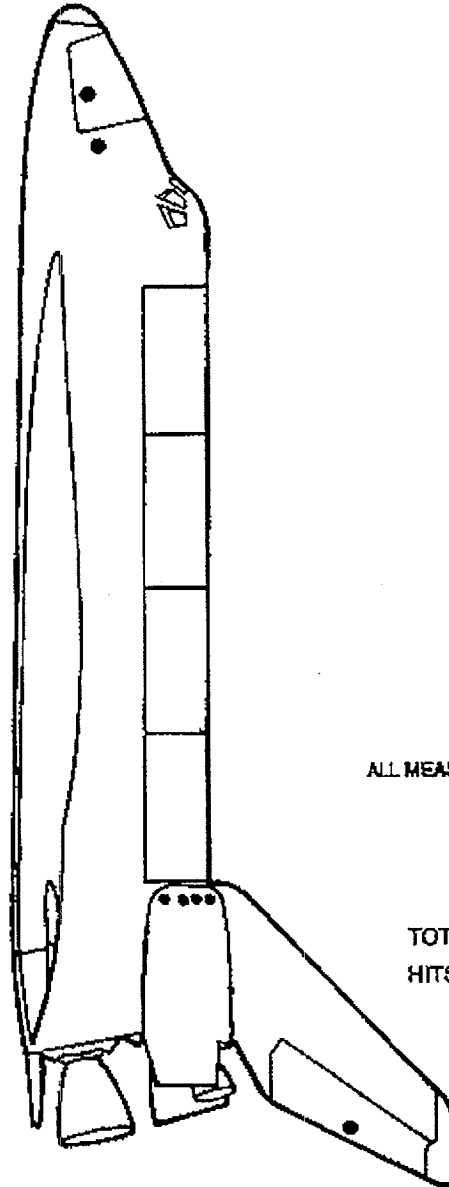
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01

3/26/01

STEP 50-1

SIS-102

**DEBRIS DAMAGE LOCATIONS**



ALL MEASUREMENTS IN INCHES

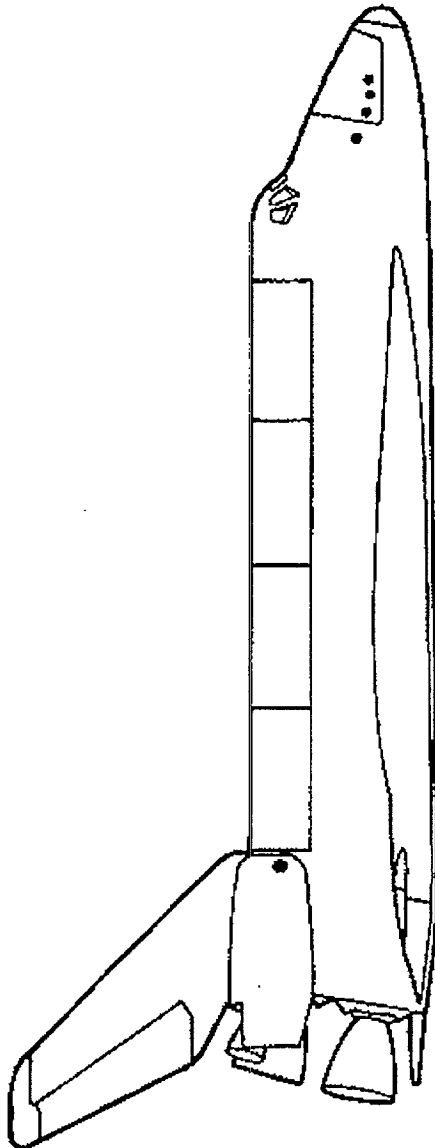
TOTAL HITS = 7  
HITS > 1 INCH = 0

EGGAC-000

STEP 150-1

STS-102

**DEBRIS DAMAGE LOCATIONS**

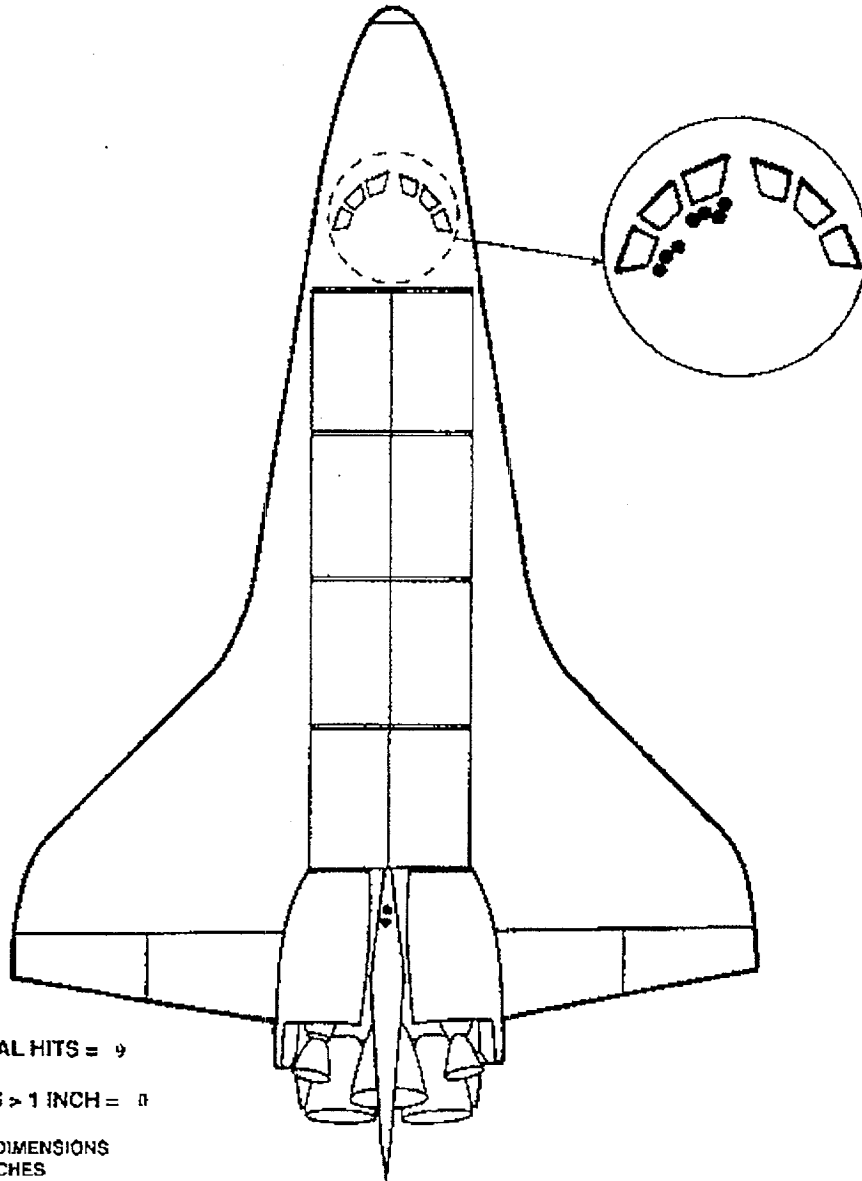


TOTAL HITS = 5  
HITS > 1 INCH = 0

ECGVC 004.2

STEP 150-1

STS-102  
DEBRIS DAMAGE LOCATIONS



TOTAL HITS = 9

HITS > 1 INCH = 0

ALL DIMENSIONS  
IN INCHES

SHER O53 0830

# STEP 150-1

STS-102 ORBITER POST LANDING INSPECTION  
Debris Assessment  
21 March 2001

After the 2:31 a.m. local/eastern time landing on 21 March 2001, a post landing inspection of OV-103 Discovery was conducted at the Kennedy Space Center on SLF runway 15 and in Orbiter Processing Facility bay 2. This inspection was performed to identify debris impact damage and, if possible, debris sources.

The Orbiter TPS sustained a total of 100 hits of which 14 had a major dimension of 1-inch or larger. This total does not include the numerous hits on the base heat shields attributed to SSME vibration/acoustics and exhaust plume recirculation.

The following table lists the STS-102 Orbiter damage hits by area:

	<u>HITS &gt; 1-inch</u>	<u>TOTAL HITS</u>
Lower Surface	10	44
Upper Surface	0	0
Window Area	4	44
Right Side	0	4
Left Side	1	3
Right OMS Pod	0	1
Left OMS Pod	0	4
TOTALS	15	100

The Orbiter lower surface sustained 44 total hits, of which 10 had a major dimension of 1-inch or larger, both numbers are well within family.

Approximately 12 damage sites (with two larger than 1-inch in length) were located in the area from the nose landing gear to the main landing gear wheel wells. The majority of the hits were around the LH2 umbilical area (22 hits). Most of these damage sites around the ET/ORB umbilical were most likely caused by pieces of the umbilical purge barrier flailing in the airstream and contacting tiles before pulling loose and falling aft. The ET TPS venting modifications continue to have a reducing effect on the quantity and size of the damage sites.

The largest lower surface tile damage site, located inboard of the LH2 umbilical, measured 1-inches long by 2-inches wide by 0.125-inches deep. A combination of umbilical ice and/or umbilical purge barrier material could have been the cause of this damage site. Left hand RCC panel # 10 has a large damage at the leading edge, below apex curve, adjacent to the T-Seal. The damage is 2.0 inches long by .120 inches wide by .100 inches deep. Carbon substrate is exposed. The same panel also had what appeared to be a surface degradation in the middle lower region of panel that is approximately .5 inch diameter. Further investigation is being conducted to determine the source of this damage.

The landing gear tires were reported to be in good condition. There was no ply under cutting on the main landing gear tires.

## STEP 150-1

ET/Orbiter separation devices EO-1, EO-2, and EO-3 functioned normally. No ordnance fragments were found on the runway beneath the umbilicals. The EO-2 and EO-3 fitting retainer springs appeared to be in nominal configuration, though one of the "salad bowl" clips were missing from EO-3. The EO-2/3 pyro debris shutters were fully closed. A small piece of umbilical closeout foam (pyro can closeout) was adhered to the umbilical plate near the LO2 disconnect. No debris was found beneath the umbilicals.

Less than usual amounts of tile damage occurred on the base heat shield. Engine number 1 dome heat shield blanket has minor damage at 6 o'clock position.

No unusual tile damage occurred on the leading edges of the OMS pods. Only four small hits were noted on the leading edge of the left OMS pod and one small hit on the leading edge of the right OMS pod. One protruding tile gap filler material was found on the R/H OMS pod, approximately 2 inches long.

Four vertical tail leading edge tile damage sites were observed. One hit on the trailing edge of the Rudder/Speed Brake measured 1.75 inches long, 1.25 inches wide, and 0.25 inches deep.

Damage sites on the window perimeter tiles were more than usual in quantity. There were a total of 40 hits on the window perimeter tiles with four having dimensions greater than one inch. Hazing and streaking of forward-facing Orbiter windows was moderate.

The post-landing walkdown of Runway 15 was performed immediately after landing. All components (except a small white seal ring) of the drag chute were recovered and appeared to have functioned normally. A piece of AMES gap filler, 10 inches long by 1 inch wide, was found on the runway, tiles gap filler have been found on previous missions and is not considered an anomaly. Numerous pieces of, what appears to be, facility paint chips were found right of centerline of runway 15. Largest pieces were approximately 3"x2". Further analysis is being conducted to determine the source of this debris.

In summary, both the total number of Orbiter TPS debris hits and the number of hits 1-inch or larger were well within established family. The potential identification of debris damage sources for mission STS-102 will be based on the laboratory analysis of Orbiter post landing microchemical samples, inspection of the recovered SRB components, film analysis, and aerodynamic debris particle trajectory analysis. The results of these analyses will be documented in the STS-102 Debris/Ice/TPS Assessment and Integrated Photographic Analysis report.

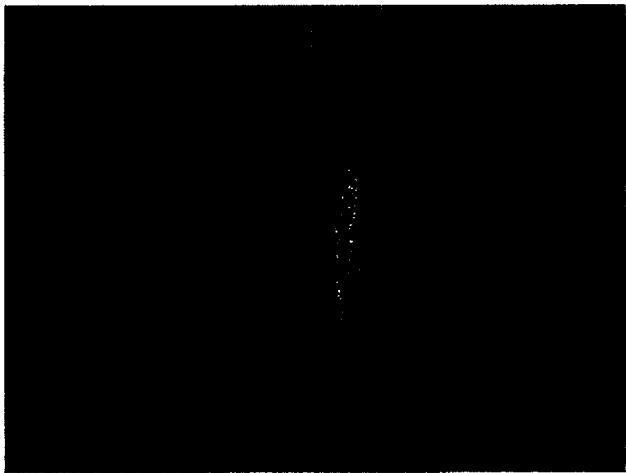
Picture (see pg 3) is of LH RCC Panel # 10 damage.

Jorge Rivera  
NASA - KSC

Robert Speece  
NASA - KSC

Armando Oliu  
NASA - KSC

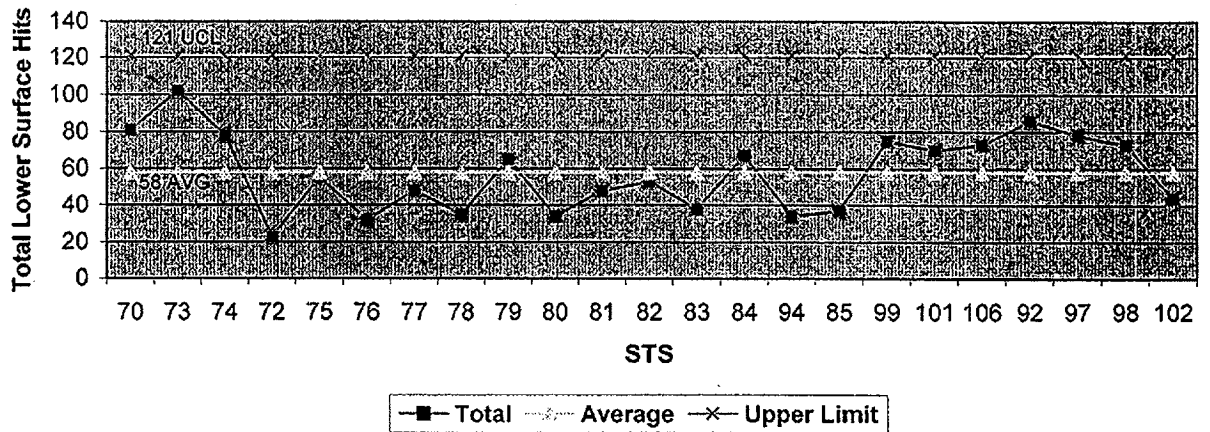
STEP 150-1



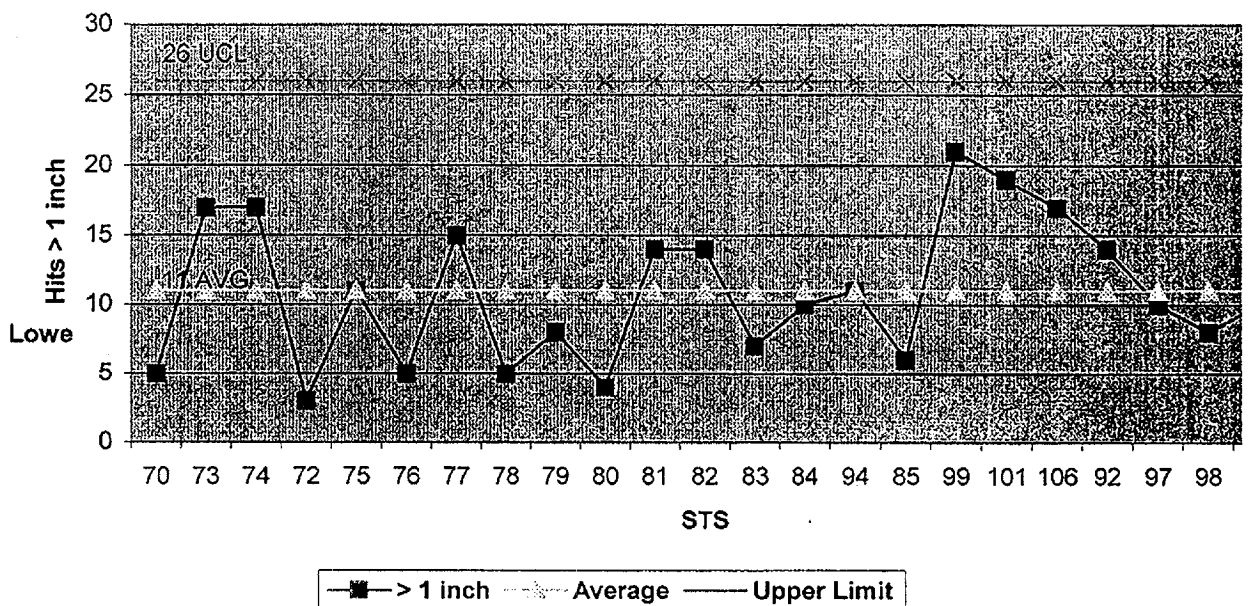


STEP 150-1

### Orbiter Post Flight Debris Damage Lower Surface Total Hits



### Orbiter Post Flight Debris Damage Lower Surface Hits >1 inch

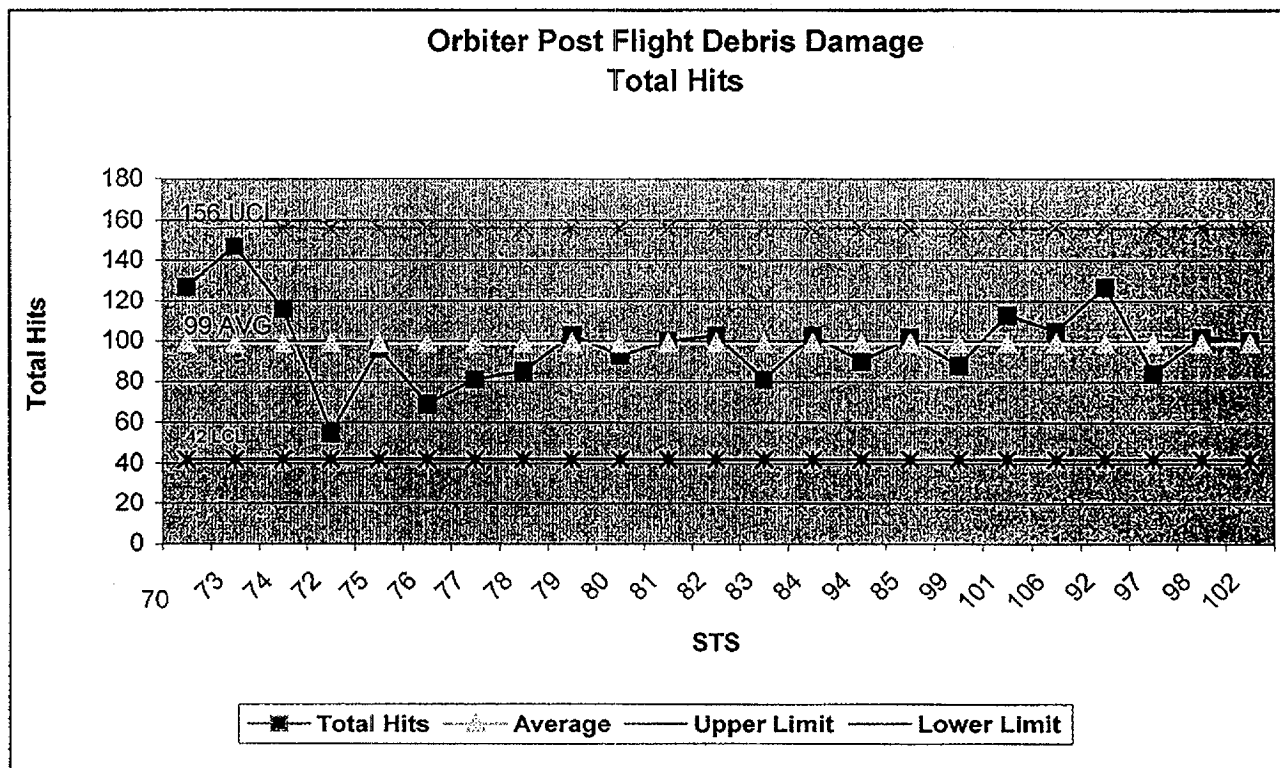
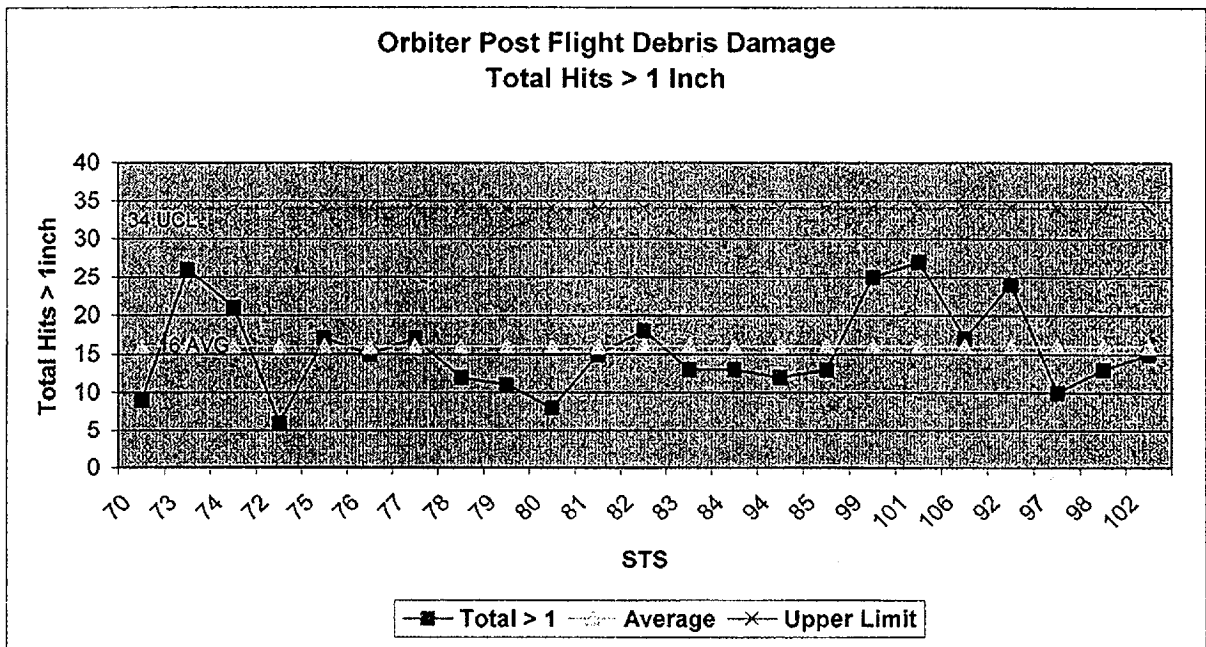


DELE  
P. Seale  
Bin 3/26/01

PG 1/2

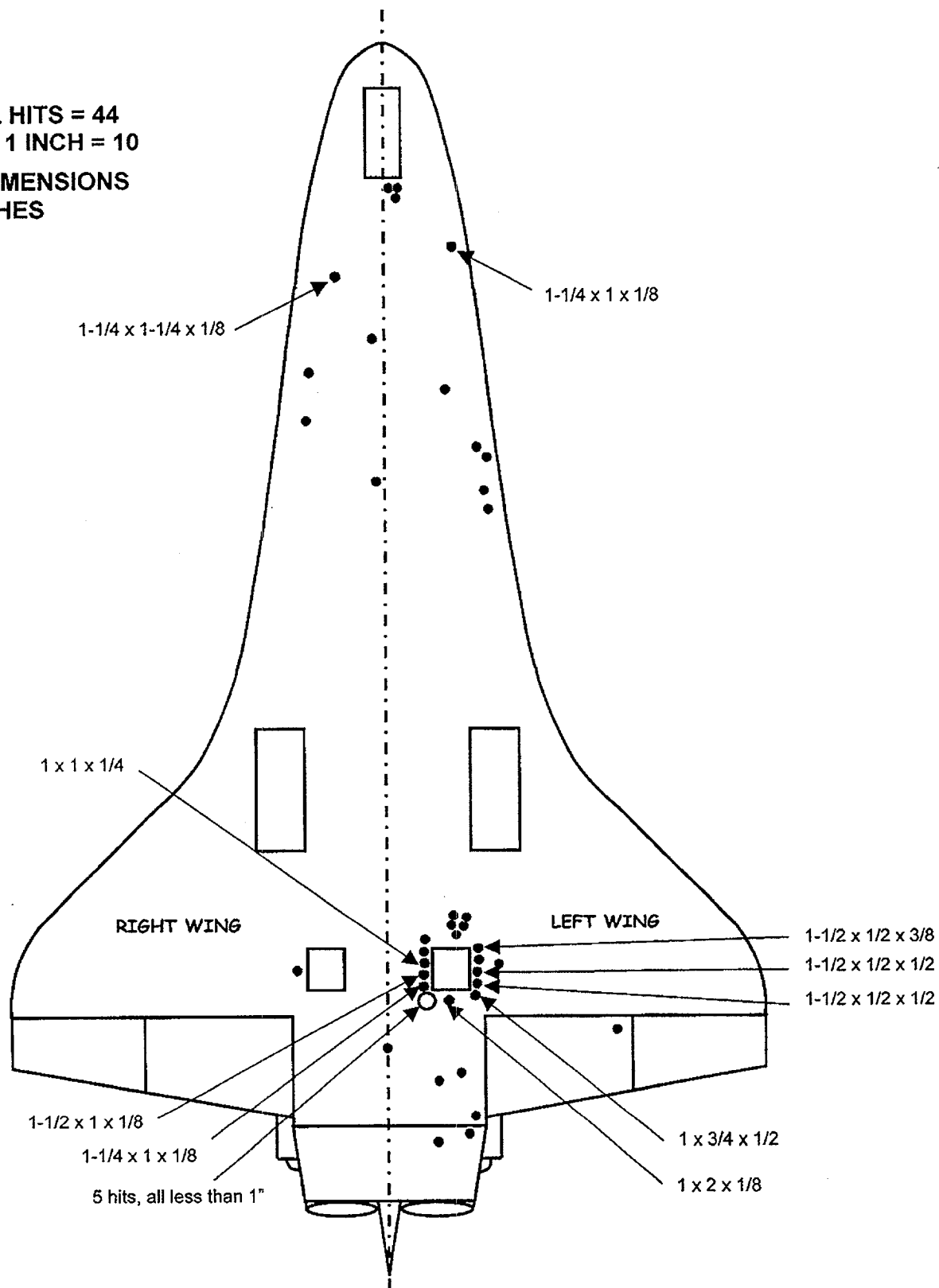
ET  
01  
3/26/01

# STEP 150-1



STEP 150-1  
**STS - 102**  
**DEBRIS DAMAGE LOCATIONS**

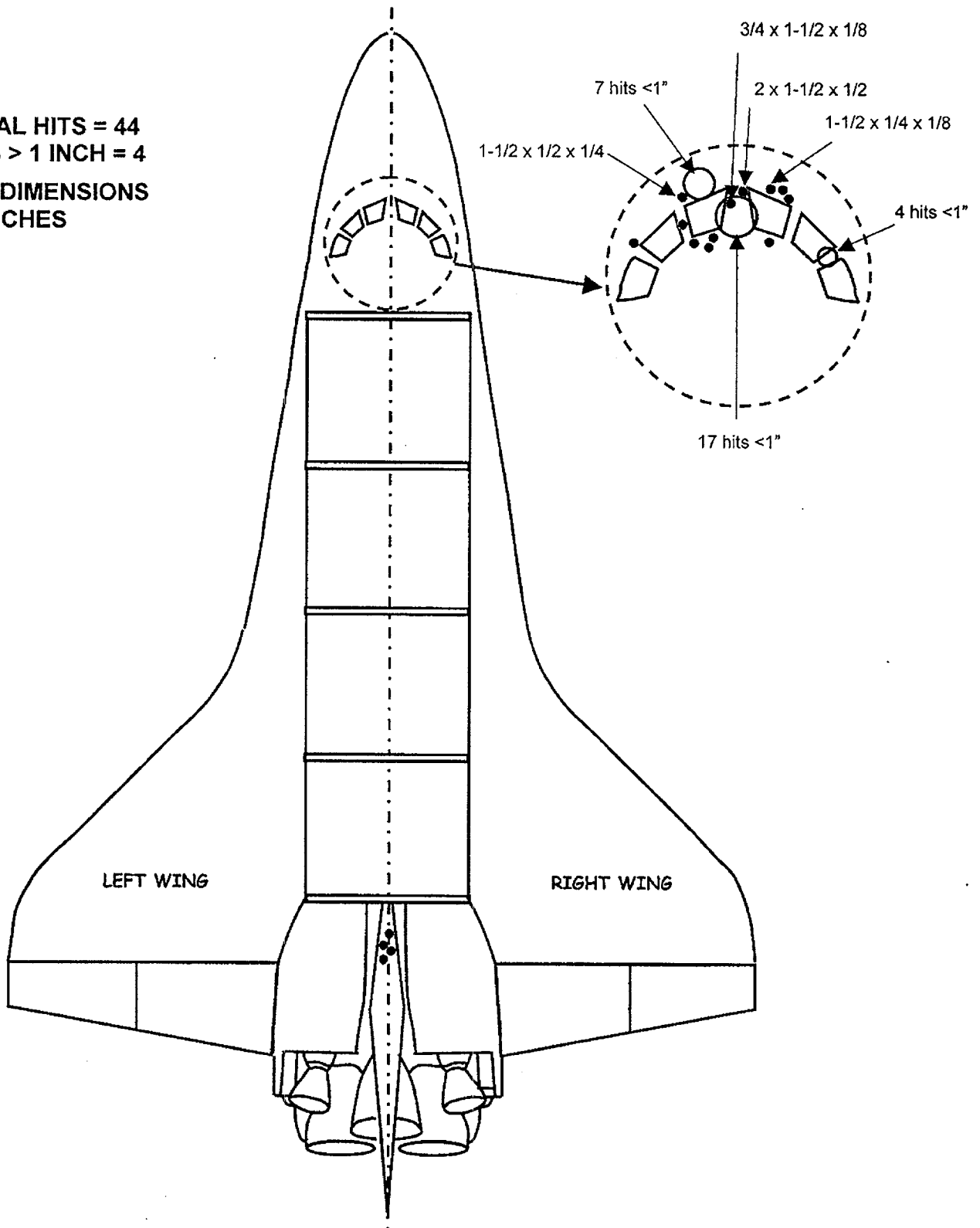
TOTAL HITS = 44  
 HITS > 1 INCH = 10  
 ALL DIMENSIONS  
 IN INCHES



STEP 150-1

# STS - 102 DEBRIS DAMAGE LOCATIONS

TOTAL HITS = 44  
HITS > 1 INCH = 4  
ALL DIMENSIONS  
IN INCHES



STEP 150-1

STS - 102

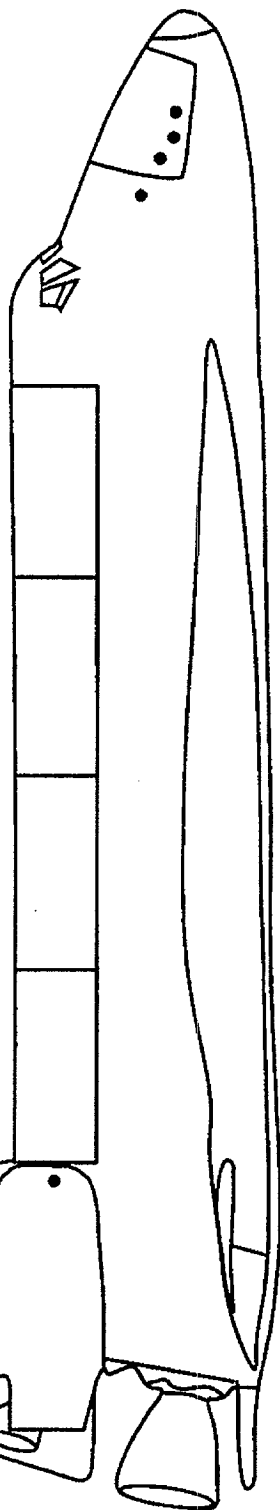
## DEBRIS DAMAGE LOCATIONS

RHS

TOTAL HITS = 5

HITS > 1 INCH = 0

ALL DIMENSIONS  
IN INCHES

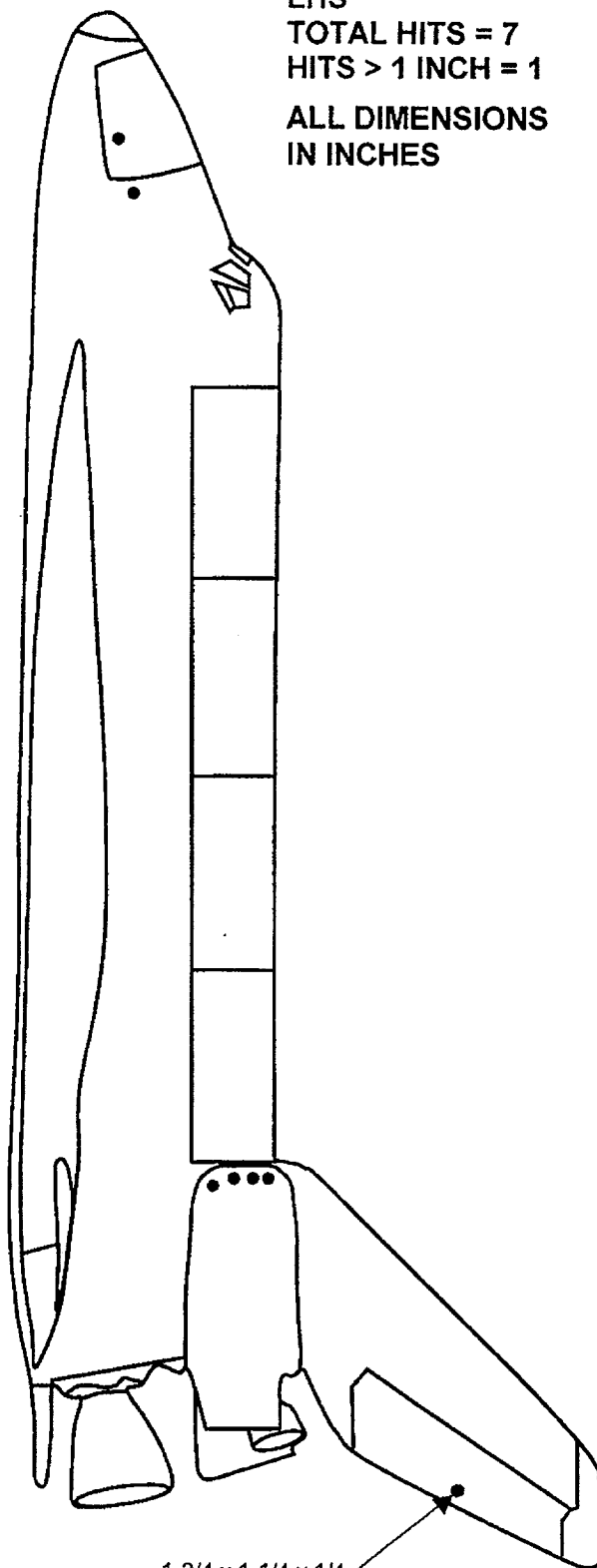


LHS

TOTAL HITS = 7

HITS > 1 INCH = 1

ALL DIMENSIONS  
IN INCHES



1-3/4 x 1-1/4 x 1/4

ET  
01

PE 3 OF 3

3/26/01

STEP 150-1

STS-102 ON-ORBIT FILM SUMMARY  
KSC Photo/Video Analysis Team  
27 March 2001

The last film data, 35mm still images from the LO2 ET/ORB umbilical camera and Crew Hand-Held Still Images, of the External Tank after separation from the Orbiter were received and reviewed at KSC on 27 March 2001. All images were in clear focus. Although the lighting was excellent for areas to the +Y side of the LO2 feedline, the -Y side of the ET was in deep shadow. The two 16 mm umbilical well high-speed motion film cameras were not flown on this mission.

No anomalies or significant missing TPS was detected and the ET appeared in excellent condition.

The visible portion of the +Y thrust panel exhibited no divots or anomalies.

The red-colored purge seal that normally fits around the EO-3 ball fitting had come loose and floated aft by its tether.

The EO-3 (LO2 side) separation bolt protrusion was noted. Protrusion appeared to be less than EO-3 bolt protrusion observed on STS-106 film. Shuttle Program investigation determined no anomaly for STS-106 bolt extension.

No damage was detected on the LO2 ET/ORB umbilical disconnect, sealing surfaces, or closeout TPS. Typical ablation and divoting was noted on the vertical portion of the umbilical cable tray.

Some small, irregular, white or light-colored objects floating in field of view is believed to be pieces of frozen oxygen or hydrogen.

No anomalies were detected in the LO2 tank acreage. The BSM burn scars were typical.

Normal amounts of TPS erosion and topcoat charring occurred on the forward ogive near the nose cone, but no divots or grooves in the TPS were observed. The composite nose cone was in good condition.

Small amount of TPS erosion/ablation was observed on the forward face of the LH2 PAL ramp.

ET LH2 tank and intertank acreage appeared nominal.

The ablation/erosion of LO2 feedline flange closeouts was typical.

NASA - KSC  
Jorge Rivera

ET  
01

3/27/01

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*****
* PROGRAM PRA120 SELECTION CRITERIA *
* ----- *
* RPT TYPE: IPR *
* PR GROUP: *
* WORK AREA CD: *
* PR ELEM CD: *
* STS NO: 102 *
* Starting RPT DT: 02/01/01 *
* Ending RPT DT: 04/02/01 *
* LRU or Non-LRU: B *
* PRACA EFF CD: *
* EICN: *
* RPT STATUS: DP *
* DETECTED DURING: S6444-J01-R01 *
* ----- *
* Sorted by DETECTED DURING, PR ELEM CD, and EICN *
*****

```

PROBLEM REPORTING AND CORRECTIVE ACTION SYSTEM  
PROBLEMS BY DETECTED DURING

\*\*\*\*\*  
\* NO DATA FOUND ON THE DATABASE FOR THE SELECTED PARAMETERS \*  
\*\*\*\*\*

\*\*\*\*\*  
\* END OF REPORT \*  
\*\*\*\*\*



44 44





United Space Alliance

# Pen and Ink Change Record

NO./REVISION

56444

EFFECTIVITY

105V103 & Subs

PAGE

SEQ/OP-STEP

CHANGE

APPROVAL  
QE/ENG.

NONE

NONE